# HOLDING CLASS ON THE HOLODECK: EXPERIENTIAL LEARNING THROUGH TECHNOLOGY

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In contemplating the future of educational technology, I question the role technology can and should play in the classroom. Educational specialists tell us that learning through experience is highly effective and that technology will facilitate this teaching method. But how can I more effectively use technology to provide experiential learning opportunities for my students?

To answer this question, I will explore the following areas: 1) the relationship between pedagogy and technology and 2) a hypothetical classroom model supported by technology that enhances experiential learning.

While much of what I offer may be based on supposition of futuristic technologies, many of my hypotheses can be adapted to current classroom models and technologies. In imagining the possibilities for integrating technology in the classroom, my secondary goal is to suggest that, as we understand the connection between teaching philosophies and technology, educators become more instrumental in shaping the evolution and development of instructional technologies.

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## Pedagogy before Technology

### *Virtual Reality: A New Opportunity for Experiential Learning*

A popular component of the science fiction show *Star Trek: The Next Generation* took place on the holodeck, a virtual reality program that allowed people to experience any world or character (literary, historical, or fictitious) generated by the ship's computer. In these scenes, Captain Picard and other crewmembers could ride horses across Wyoming's prairies or match wits with criminals in Sherlock Holmes' nineteenth-century England.

The appeal of this fictional technology stems largely from the sensation that participants are having genuine experiences. In the holodeck, participants *experience* a reality as it is *portrayed* by technology. Education specialist Janet Murray suggests that, like the holodeck, instructional technologies may someday include virtual reality experienced in life-like contexts, creating a blurred distinction between virtual and "real" experiences.[1] Although we call such computer-controlled representations "virtual reality," this term raises a question about privileging realities:[2] how significant is the pedagogical difference between actual experience and virtual experience that is seen, heard, smelled, touched, felt, traveled through, or impacted by action and choice? Imagine the educational implications of such "virtual" experience.

President Clark seems to invite us to imagine such implications. In his inaugural response, President Clark called for future technologies to "break down the barriers of time and space and connect our students" by "creat[ing] outstanding, interactive educational experiences. In these experiences students [and faculty] will teach one another in new and powerful ways."[3]

In contrast with these future potentials for technologies, our current technology may seem in the "Kitty Hawk" phase of development. Virtual reality may be frequently disrupted as faculty wait for slow computers to reboot or fumble with unfamiliar technology. Hopefully, these disruptions will be resolved soon. During his September 15, 2005 University Forum, President Clark explained the progressing development of technological modularity.[4] Modularity would promote compatibility between digital resources, and this integration could make using technology easier. Imagine seamless interfacing between technologies that allow teachers to focus on teaching and learning and not on making technology work.[5] Imagine reliable technological tools that will work all the time for everyone regardless of the user's skill level. While *Star Trek's* holodeck might be light years away from the classroom, with these increasingly compatible technologies perhaps another of Roddenberry's creations is relatively close. Imagine activating resources by simply addressing the multi-media console in the classroom with a voice command: "Computer, access files for English 313."

*Pairing the Right Teaching Philosophy with the Right Technology*

A common mistake in incorporating technology in the classroom is just layering technology on top of existing teaching theories and strategies. *PowerPoint* simply serves as a colorful version of the overhead projector. DVDs replace VHS (or going back many years, the filmstrip). Yet, has the philosophy influencing my decisions of how and why to use technology changed? If not, am I really providing experiential learning for my students? Although I hate to admit it, many times my students have patiently waited for me to boot up the computer, warm up the overhead lamp, and find the correct file; and ultimately, I question the actual impact of this multi-media extravaganza. How does watching instructors, or even other students "teaching" the class with a presentation, as they project notes/visuals on a screen provide experiential learning for the students?

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In contrast, technology should and does have the potential to provide experience—virtual and real—for our students, and we can take advantage of this potential right now. While future technologies will make this integration simpler, particularly for those with little technological savvy, educators can use existing technology more effectively. A key

element for tapping into this potential lies in adapting our teaching strategies rather than simply embracing new technologies. In fact, many educational technology advocates do not focus on technology training but on persuading educators to use teaching theories that provide richer experiences for learners through technology.[6] Such theories include integrating multiple subject areas into one course, addressing varied learning needs, providing authentic project-based assessment with formative feedback, and promoting collaboration. These teaching methods are important to experiential learning and are considered significant components of adult learning theory—a theory many educational technology specialists promote.

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While some faculty may debate calling our students *adult* learners, our church leaders and administrators have frequently charged us with preparing our students to be lifelong (i.e., mature or adult) learners. What are key characteristics of an adult learner? Malcolm Knowles, former Executive Director of the Adult Education Association of the USA, outlines the following "dimensions of the maturing process." Students become adult learners as they increase their ability to move from:

1. Dependence toward autonomy
2. Passivity toward activity
3. Subjectivity toward objectivity
4. Small abilities toward large abilities
5. Few responsibilities toward many responsibilities
6. Focus on particulars toward focus on principles
7. Superficial concerns toward deep concerns
8. Imitation toward originality[7]

These dimensions of the maturing process can be used to formulate course objectives and teaching methods. We might provide opportunities for students to move from passivity to activity by increasing student participation. Service learning can help students shift from focusing on particular, isolated concepts to understanding large principles. While many methods can accomplish these objectives, the remainder of this article will illustrate how these dimensions of the maturing process might be developed through experiential learning enhanced by technology.

## Promoting Adult-Centered Learning through Technology (i.e., The Holodeck in the Classroom)

With such goals in mind, instructional technology should support the pedagogy and not vice versa.[8] Below I outline a hypothetical classroom model that uses technology to support an adult-centered, experiential learning education model. Learner-centered pedagogies often require integrating content areas, which assists students in moving from acquisition of small abilities to large abilities.[9] Similarly, learner-centered classes ask students to accomplish authentic, project-based collaboration, giving students greater responsibilities for their learning.[10] This approach also promotes President Clark's goal of "students…teach[ing] one another in new and powerful ways."[11]

In constructing this hypothetical classroom, I will begin with a course that I currently teach: Advanced Writing for Elementary Education majors. However, this "new" course will also integrate subjects such as instructional technology and what are now provided through several elementary education courses: Exceptional Students, Literacy, and the early field experience practicum. Participants in such a course might include three college professors—one from English, one from education, and one from instructional technology—and students majoring in elementary education. This collaboration might also include the elementary teachers in whose classrooms the college students will work.

### *A Model Day on the Holodeck*

The model day for this hypothetical course begins with a virtual conference between the college teachers and elementary teachers in order to coordinate needs of the elementary students and the college students who will train in the elementary classroom that afternoon. The conference focuses on how the college students will support the elementary children. A master computer, which seamlessly facilitates the entire conferencing session based on verbal or typed commands, records the conference in video and audio for everyone's reference. Professors share sections of this recording with specific college students by instructing the computer to digitally drop specific sections into the appropriate directory and send a notification through a wireless, handheld device. These miniature devices, besides functioning with full computer capacity, also function similarly to current cell phones, Ipods, and Blackberries. All participants in this scenario carry these miniature devices, which have continuous WiFi connection with the master computer.

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After this initial conference, the education teacher, composition teacher, and instructional technology specialist coordinate ideas for their upcoming two- to three-hour session with the college students. The course objectives for all three professors are to guide preparation for teaching

in the elementary classroom later that day, to promote college students' learning about literacy issues, and to provide support as students assess and overcome weaknesses. As the undergraduates work on these literacy projects, the teachers want the college students to practice and develop composition and technology skills. In planning to accomplish these course objectives, the college teachers review individual college students' batteries of assessment, comparing where each college student is to where each needs to be.[12] They can readily access such information with a voice command on the major computer, the desk or lap top computers, or the handheld devices.

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To meet the learning needs of that particular day, faculty direct the computer to change the physical setup of the classroom. As it is directed, the computer rearranges, brings out, or puts into storage the chairs, tables, desks, computers, monitors, wall monitors, and shelves with resources.

No longer do undergraduates move from building to building, class to class. The computer system provides in one place all that these elementary education majors need. Soon, the college students will enter the classroom and join in the conferencing/planning session. (When needed, the elementary teachers also virtually join this conference with the college students.) After conferencing, which includes assessment, analysis, evaluation, goal setting, and planning, the college students begin working in teams or individually, based on specific needs: either on their own learning needs as identified by their assessment records or on their preparation to work as an aide in elementary schools during the afternoon practicum. Via the master computer database, which automatically interfaces with all Internet databases upon command, each student has appropriate access to information about his or her elementary children and almost unlimited access to information on literacy issues as well as case studies and examples or lesson plans from around the world. The college students work on lesson plans, prepare teaching materials, study and research best-practice materials, and prepare materials for their elementary children.

The college composition teacher, education teacher, and technology specialist circulate around the class discussing projects that the college students are working on, making suggestions about resources, learning what new resources the college students have located, asking and answering questions, and connecting groups of students to share ideas. Each professor records verbal or written notes in a handheld device for informal, observational assessment. Their notation enters the main computer system seamlessly, where it will be organized and stored for immediate retrieval. The professors do not have to attend to logistics to accomplish this interfacing; the computer system manages organizational tasks like these automatically. As appropriate, these assessments are shared with the other college teachers or the elementary teachers.

Some undergraduates develop information to share with elementary classroom teachers, administrators, or parents about students' needs and resources to meet these needs. (Currently it is difficult for elementary classroom teachers to communicate all necessary information to appropriate stakeholders.[13]) A master computer, instantly facilitating communication dispersal and retrieval, allows for clear communication with stakeholders. The undergraduate researchers and record keepers are an invaluable resource to maintain ongoing communication with the stakeholders, and the professors easily direct this reporting. Undergraduates leave class as they finish their individual tasks or when time comes for them to leave for their practicum experience in the elementary classroom.[14]

After the college students finish at the elementary school, the day concludes with a brief conference between the college and elementary teachers to debrief, compile the day's records, and determine where to start next time.

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*Assessing the Holodeck Model as Means for Promoting Adult-Centered Learning*

Unlike college courses today with the teacher directing and controlling class events, in this integrated model students direct and control individual, performance-based learning according to the objective "prepare to teach in the elementary classroom as a student teacher."[15] Faculty and technology support the individual, as professors and students collaborate to meet individual needs of each member of the class. Professors do not disseminate knowledge but help the students discover what knowledge is needed to accomplish their objectives (thus helping students become adult learners through problem-solving) and discover the resources available to provide the necessary knowledge.[16] Courses such as Advanced Writing for Elementary Education and Educational Technology provide knowledge situated in real-life contexts rather than introduce arbitrary skills to master. Professors, college students, and elementary teachers work in a learning community that is sometimes virtual but always mutual. Ready technological communication resources foster such an atmosphere.[17]

*Student collaboration through technology.* The class members work in collaborative teams.[18] Some work in pairs, some individually, some in group discussions. On a typical day, teams of college students spend half their day preparing with college professors for the second part of the day, when they work in an elementary classroom. Team sizes depend on the need, project, and activity of the moment. Because of the technological facilitation, teacher integration, and pedagogies that are project-based and performance-based, the collaboration focuses on accomplishing real-life tasks, not on the logistics that encumber grade-oriented, competitive students from realizing full collaboration.[19]

Collaborative teams are determined by digital assessment portfolios that include interests, experiences, personality types, communication

preferences, talents, and other related learning variables.[20] Varied assessments of these portfolios are easily available on the Internet.[21]

How might such a collaboration take place? Elementary teachers' input begins the process. Elementary teachers explain classroom plans, elementary students' needs, and other concerns. These teachers share this input with college faculty and students via teleconferencing, online chats, and virtual meetings (currently available through instant messaging, video conferencing, etc.). The elementary teacher, with input from college faculty, recommends the types and sizes of particular teams or even requests a particular college student with appropriate skills or interests. Next, college teachers and undergraduates fine-tune team configurations. Finally, in a conference with the elementary teachers, professors, and college students, the teams are set. However, through ongoing conferencing and assessments, the teams are adjusted for upcoming special events or to meet specific needs.[22]

Beyond determining collaborative teams, professors and college students determine what individual undergraduates need to study. The source for these decisions might be a multi-dimensional, multi-media digital portfolio with formal and informal assessment documentation. Students have been building this portfolio throughout the academic experience. For each class, they add evidence of their learning. With this portfolio as an assessment tool, college teachers and undergraduates compare student strengths and needs to state teacher-standards.[23] A significant component of this comparison is the pre-service teaching standards set by national, state, and community professional organizations.[24] These standards are applied and interpreted by the college administration, department committees, the course teachers, and the students themselves.[25] Both the details of the standards and the particulars of each student are easily and instantly obtained through the master computer,[26] perhaps similar to how students now access their graduate report on the University website.

**Because students are involved in setting their own course objectives and in their own assessment process, each has increased motivation to identify his or her individual strengths and weaknesses.**

After initial goal-setting assessments, participants use digitized rubrics to provide formative feedback on student projects and assignments.[27] These rubrics provide opportunity for student self-evaluation, teacher feedback on projects and the practicum teaching, even feedback from the elementary teacher and elementary students.[28] Rubrics may also provide feedback among student teams and the class as a whole. College students reciprocate with feedback for the college teacher on the course so that teachers can guide the course to meet the students' needs.[29] College students also give feedback to the elementary students as appropriate under the direction of the elementary teacher.[30] Rubrics and other similar assessment tools are readily available from the Internet resources and are found by the computer upon command.[31] They are easily revised and

adapted for specific situations. The computer makes it easy to record, organize, and access this feedback.

Providing a real-life context for learning leads to many significant, and admittedly idealistic, benefits. Because students are involved in setting their own course objectives and in their own assessment process, each has increased motivation to identify his or her individual strengths and weaknesses.[32] Undergraduates work in the class not to get grades but to meet standards for certification and for the second half of the day, where they must teach material learned earlier.[33] Because of immediate and real-life application of material, assessments are perceived not merely as a grade but as a tool to direct instructional planning and preparation, and to allow for reaching specific goals.[34]

*Integration of faculty and support services.* The course is project-based.[35]It is integrated across disciplines combining composition skills, elementary education pre-service training, and technology skills with a real-life service learning practicum and teaching experience.[36]

The composition teacher teaches education majors to communicate in multiple media as the students complete their projects.[37] These media include integrating audio, video, text, and other active means of communication.[38] College students write to a real audience, for a real learning need, and in a real situation. Additionally they add to their own electronic portfolios as they develop class assignments for real elementary students, research for and write grant proposals, communicate with parents, elementary faculty, public school administrators, and other public school stakeholders, etc.[39] Enhancements to these projects will come from input from faculty in the education department, who will integrate pre-service training into the course.

The classroom elementary teachers are the third group benefiting from this computer-supported collaboration. Technological collaboration will free elementary teachers from the responsibility of "teaching" college students and allow elementary teachers to focus on meeting the elementary students' needs. Today much responsibility for giving feedback to student teachers falls on the elementary teacher. This responsibility results from college supervisors having many students to visit and the burden of travel time, which limits time for conferencing. Thus, colleges have to pay an elementary teacher to work with a student teacher to provide additional training. Because of this increased workload, some elementary teachers will not work with student teachers even if provided a financial incentive.[40] In the holodeck-model course, professors have visual and auditory access to the elementary classroom through technology. As a result, professors can offer more credible support to the college students in the elementary classroom. It is up to the professors to ascertain that the undergraduates have the knowledge, strategies, and skills necessary

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to be effective in the service learning practicum and have prepared well for each day's lesson.[41]

Finally, an IT specialist supports not only the college students who are learning technology skills and applications but also the professors and elementary teachers. Ongoing instructional technology and professional development are necessary since technology resources rapidly change and progress.[42] Currently the most frequent complaints about instructional technology center on lack of understanding, lack of training, and lack of time for training.[43] In the holodeck model, the instructional technology specialist is able to provide hands-on, real-life training and application. This integration also provides valuable professional development and training for the college teachers and elementary teachers in real-life needs.[44]

*Technology facilitating an integrated course.* The computer seamlessly facilitates conferencing. It does not matter who is physically in proximity with whom. This communication, facilitated via multi-media technology, allows all participants to easily see displays. For example, the leader says: "Show Mrs. Jones' social studies class project to everyone." At once all class members see, in real time, these children demonstrating and explaining social studies holograms.

To meet various physical needs, learning styles, or preferences, each display screen has multiple inputting capabilities: keyboards, mouse-like devices, verbal commands, touch-sensitive screens, and joy sticks. Participants can readily convert from one input medium to another as activities progress. For example, students can be typing on a keyboard and looking at a vertical screen and then flip the screen to a horizontal tablet. One student can then draw a diagram with a laser pen.[45] Finally, a student might use a voice command: "Color this section blue."

Databases are created and easily accessed through the Internet. These databases and web resources are also easy to search. The search starts with what the user wants to accomplish. Then, the computer makes suggestions to the user, offering what is needed when it is needed. Instead of requiring participants to be masters at using search engines and Internet databases, the computer actually helps college students define and refine search needs.[46] Some examples of the types of information in the database might be notes from previous meetings, conferencing, or class sessions, etc. Databases include auditory or visual recordings of events in the physical or virtual classroom. These recordings can be reviewed, stored, and shared as needed.

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## Conclusion

Interestingly, most of the technologies I imagine in the above model are currently in use, being tested, or on the near horizon.[47] The technology itself is not the missing component in this learner-centered style of

education. The online educational magazine *The New World of Learning: Edutopia* frequently showcases what may seem like fantastical uses for instructional technology in both wealthy and poor school districts.

As *Edutopia* illustrates, it is lack of neither money nor technological capability that prevents students from enjoying the educational benefits imaginable in a holodeck model. The ingredient missing is an educational philosophy to drive the use of this instructional technology.

Educational philosophy precedes and drives instructional technology, not vice-versa.[48] Steve Jobs, one of the inventors of Apple computers, claims that the most crucial element lacking is imagination.[49] In this case, it would be the imagination of teachers, administrators, students, parents, society as a whole.[50] First, we must imagine teaching in a classroom with interactive, experiential communication media. Perhaps the next frontier in education is just on the brink of our imaginations.

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## Notes


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