

The Changing Role of Technology in Educational Settings

by

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Approved by the Committee for the Assessment of Student Competence at the School for New Learning of DePaul University for ILP S-3-F. Used with permission of the author. Annotations by Joe Hemmerling, Research Assistant, and Michelle Navarre Cleary, Assistant Professor and Writing Coordinator, The School for New Learning.

Introduction

I have been involved with education and training for almost all of my life, either as a receiver (student), creator (training developer), or educator (instructor). I have seen the changes that have occurred in how facts, data, or instruction are delivered to a single person or a large classroom of people. And I have observed the ways in which the different ages of the students' impact how the information is received and processed.

A generation ago, technology in training and education consisted of little more than a sixteen-millimeter film being shown to a class of students, who viewed the film as an opportunity to forego taking notes and grab a quick nap. "To learn" meant to read a book or a variety of printed handouts, listen to a lecture on the topic, and then complete an assignment - usually in the form of answering questions or writing short essays. Every class - whether in grade school, high school, college, or business - was based on written materials. Without books and chalkboards, there was no teaching or learning.

Today we see that education and training look very different than years ago. Computers are in every classroom. Videos and DVDs show demonstrations of how things look and move and operate - a marked improvement over static pictures. CD-ROMs and web-based training allow the student to interact with the subject matter, and progress at

Commentaire : The student starts by establishing his credibility right off the bat. The reader understands that, as someone who has been involved in education his entire life, the author is someone whose opinion matters on this subject.

Commentaire : Notice how the author sets up a contrast by using "A generation ago" to start the previous paragraph and "Today" to start this one. His ability to sum up this historical transformation also further reinforces his credibility.

his or her own pace. Even more perplexing is the fact that there are four distinct methods of technology being used in the learning environment: technology as the curriculum; technology as an instructional delivery system; technology as a compliment to instruction; and technology as a tool used to enhance learning activities (Ginsburg 37).

Training and education have gone from passive and reactive to aggressive and interactive. But does this mean that students are learning any more or any better?

It is through my life-long immersion with training and education that I am able to demonstrate my experience and knowledge of the **S-3-F competency: *Can analyze the integration of new technology into a specific field of human endeavor from at least two perspectives.*** I will provide a brief overview of a field of human endeavor (education and training) that has been reshaped by new technology; then, I will analyze the significance of the technology from the perspectives of effectiveness (is it the teaching panacea that it is hyped to be?) and economics (is it cost-effective?).

I - What is Education and Training?

In many cases, the terms “education” and “training” are used almost interchangeably. And it is true that there are, at a glance, many similarities. Whether you are in a university setting or a corporate training setting, chances are you attend a class, follow the direction of a teacher or instructor, and use a textbook. However, most educators agree that education and training are two very different things.

David Bruning, in his article Education or Training, boils down the differences succinctly. He equates training with the learning of concrete skills, while positing that education encourages not simply skills, but the linking of concepts and the synthesization

Commentaire : This is one way of using your sources in your paper. The student summarizes an idea culled from Lynda Ginsberg’s article then inserts it seamlessly into the flow of his own ideas. Not every piece of information summarized from your sources needs to be introduced like the one in note 7, but always be sure to include a citation.

Commentaire : The competence statement acts as your paper’s thesis. Place it close to the beginning of your paper to remind yourself to stay on-topic.

Commentaire : In this sentence, the student lays out the exact method by which he will explicate his thesis: the points he will address and the order in which he will address them. Note how he uses key terms from the competence statement (“field of human endeavor,” “new technology,” “analyze” and “perspectives”) to make clear how he will address the competence.

Commentaire : This is a good technique for contrasting two related concepts. The student begins by admitting the similarities between the two items. Then, in his next paragraph, he examines the features that distinguish them.

of new ideas (11). Having taught in both academic and corporate settings, I concur with his thesis. Most of the training programs I designed and produced for business use had a specific goal of making the viewers do something different than they had before. Training was meant to induce a result: more units created, less accidents occurring, the correct way of following a procedure. The teaching I did in a college setting was geared toward creating a curiosity in the students, and driving them to investigate how they could use what they were learning to do more, different, and unexpected things. It was opening them up to what they could do if they took a risk.

Commentaire : The student makes good use of his sources to back up his claim. He introduces the summary by mentioning the author and article from which the citation was taken, then succinctly summarizes the author's ideas in a single sentence. The student then follows the citation with his own remarks, explaining how the citation is relevant to his paper.

I have developed materials for both training and education as defined above, and have taught in classroom settings in both environments. While the tools are the same and the concepts similar, I have seen firsthand that the motivations and the goals for the students vary between those who are being "trained," and those being "educated." Since the primary charge of the developer or instructor in either environment is the same - "get the correct knowledge from point A to the students so that they understand and retain it" - I shall, in the course of this paper, look at technology in the learning environment as a whole, rather than narrowing the scope toward either training or education.

Commentaire : Notice the transitional device that allows the student to move smoothly between two different yet related ideas; i.e. from his discussion of the distinction between students being "trained" and "educated" to his declaration that he will discuss both.

II - How Do Students Learn Best?

Researching learning styles has been fertile ground for academics for many years. The advent of technology in the learning environment (whether computer-based learning, interactive media, or video-DVD) has added variables to the mix, but has not fundamentally changed how people best receive and retain information. We need to remember that technology is simply another tool to be used by the student to enhance the

process of learning. In fact, whether or not technology is involved, many researchers have discovered that most people have four basic factors that allow learning to take place (assuming that the motivation to learn is present within the student).

Commentaire : This sentence allows the student to segue into the next four paragraphs of his paper, discussing the factors that allow learning to occur.

First is interactivity. People tend to learn best when they are engaged, active participants in the learning, as opposed to passively receiving instruction or information.

Commentaire : The paragraph is introduced with a sequential transition. This not only links this paragraph to the previous one, but also signals to the reader that this is only the first of a list of multiple concepts that will be explicated in the following paragraphs. The paragraphs that follow are introduced by the transitions “also,” “third,” and “finally” and help organize the sequence.

Learning activities where the students are participants, such as group learning, experiential learning in laboratories, or field work allow students to process and interpret the concepts they experience (Leonard 385). I have seen for myself a marked increase in student retention of information when I use participatory exercises in teaching. For example, lecturing about “idea generation and its application to business media writing” left students disinterested. However, talking briefly about an idea generation concept or game, then breaking students into groups and imploring them to use that game to generate ideas for a given topic, typically brings the concepts to life, and allows the students to experience how the concepts actually can be used in practice.

Commentaire : It’s a good idea to use examples in your paper to demonstrate to your reader how the ideas you’re discussing translate from the abstract world of theory into the concrete realm of practice.

Trust is also a factor in how well students learn. What is meant by trust is the legitimacy of the teacher, the subject matter, the examples, and the organization itself (Bloland 131). Students want to know that what they are learning has credence. A textbook, a formal classroom in a school building, an instructor with name recognition in the field - those variables introduce an assurance of quality and trust into the learning environment. One issue with distance learning is that there is no guarantee that the instructor on the other end of the T1 line is who he or she claims to be. Can a student trust an instructor that cannot be seen, or a curriculum that exists only as a Word file?

Commentaire : Here, the student offers a quick definition of a potentially ambiguous term, “trust.” This is a good tactic to use when you are discussing a “loaded” concept, or when you are using a term in a highly specialized or specific way.

Third, for students to learn best in any situation, they must be able to relate what

they are learning to their life experiences. In corporate training situations, this can be obvious: learning about new underwriting procedures would naturally relate to a group of underwriters. Similarly, teaching a world geography class in college would be more interesting to, and be retained better by, students who are concerned with the current geopolitical climate in the world. When a subject matter can be interpreted to our own life, we tend to learn better (Selwyn and Gorard 9).

Finally, learning happens at its highest level when a sense of community is fostered. In a classroom, you are with a group of peers, studying similar concepts and topics. This sense of community, of being “in it together,” allows collaborative learning to take root and propel students forward. This is perhaps one of the most difficult factors facing the developers of distance or on-line training in the 21st Century, since little face-to-face interaction is possible between classmates (Carter 33).

These four learning factors should be present in every learning situation, whether live or on-line, lecture or interactive. The challenge for technology in the educational setting is to enhance the learning experience while making sure these concepts are acknowledged and brought to the forefront of the learning experience. As has been discovered, technology alone does not guarantee successful transfer of knowledge from instructor to student.

III - Has Technology Positively Impacted Learning?

Many educators and technology advocates expected computer-based technology to change the entire concept of what training and education could be. Indeed, some educators assumed that by simply putting information on-line, it became training (Shank

Commentaire : This is a very short paragraph that acts as a transition between the previous section of the paper (defining the four essential learning factors) to the next section of the paper, which considers whether technology is beneficial to learning. Very little in the way of actual information is presented here, but it prepares the reader for the next development of the student's argument.

30). While technology does allow students to experience some topics in ways previously unthinkable (i.e. the impact of Holocaust survivors via the Shoah Visual History Foundation's multimedia productions), technology must be viewed as a tool, or a system of delivering sights and sounds that traditional teaching tools could not (Hammer and Kellner 522).

Perhaps the most obvious impact technology has made on education is the ability for many people to learn simultaneously from various different locations. No longer are learners required to gather at a predetermined time and place in order to receive instruction. All that is required is a computer with modem, or a computer with a CD drive; these tools have brought learning into the homes and offices of all people. Statistics back this up: for instance, during the 1999-2000 school year, the University of Maryland University College (UMUC) had students register for over 40,000 distance education classes (Stella and Gnanam 145). And in 2001, eleven universities throughout Great Britain and the United States joined forces to create on-line learning partnerships (Carr).

However, bringing the classes to the students does not guarantee that the students will indeed choose to participate. On-line classes may be more convenient, but for people to take advantage of it, they must create time for it (Carter 34). Plus, studies have found that the people most likely to take advantage of on-line learning are the same people who are most likely to take advantage of traditional learning opportunities (Gorard and Selwyn 86). Finally, studies have shown that students who are part of less affluent population groups often do not have access to the technological tools needed to partake in long-distance classes (Kotrlik and Redmann 203). These same students also tend to have

less computer literacy, another barrier to success in the on-line classroom.

In addition, just because it is available to all does not mean all who participate in on-line learning are suited to it. It has been found that on-line and web-based instruction is most successful not only when the student has a predilection toward self-directed learning, but in fact when the learning design encourages self-directed learning (Giguere and Minotti 15). Students who work well in groups, or thrive in a close, supportive environment, probably will not do well in an on-line course.

Indeed, Flew argues that where technology-enabled learning has historically been a one-way distribution model, a more flexible system of teaching via technology is necessary to enhance the quality of learning (55). Many schools and businesses are addressing this feeling of distance by creating on-line communities for the students of a class. Items such as live chat rooms and bulletin boards allow students to collaborate and interact even while isolated in their own space. Blended modules, where face-to-face interaction is required at the inception or conclusion of an on-line class, are also become more prevalent (Carter 33). Since a sense of community is so essential for learning to take place, many developers of on-line and multimedia training are designing these courses with participatory elements in mind.

One undeniable benefit is that on-line and CD-ROM training allows the student a great deal of flexibility in regards to pacing of the education. Multimedia tools eliminate the need for instructor-led lesson plans that require the entire class to proceed at the same pace. Thus, students who grasp the concepts and information can move along without being held back by those who might need more time and assistance. The students who do need more help can get the assistance they require without holding back other students,

Commentaire : This transitional phrase helps to make explicit the connection between the subject under discussion (ways that on-line education might be improved) to the four essential learning elements he spoke of earlier in the paper.

which may cause restlessness and boredom (Lewis 24). As an instructor, I found this aspect invaluable. In an introductory media production class I teach, the use of on-line modules and DVDs allow me to let the more knowledgeable students to progress through lessons and begin production, while I can spend more one-on-one time with other students who require individual assistance. Those students who “forge ahead” tend to become the mentors for other students, and due to their peer standing can connect with their fellow students perhaps in ways that I, as an instructor, cannot. Using technology to encourage individual pacing allows me to produce in-class “teacher’s assistants,” which benefits all students in the class.

Another benefit of technology in the learning environment is the experiential aspect it fosters. The Shoah Project demonstrates the power of marrying archive film footage, photo stills, filmed testimonials, historical texts, and interactive research archives to not only tell the story of the Holocaust, but to put faces and emotions to it, and to bring the pain and horrors of the experience to the viewers (Hammer and Kellner 523). One could read books about the Holocaust, see black-and-white film clips, view photos - but the multimedia juxtaposition of the elements, as well as the immediate ability to link events to people involved, make it an active experience rather than a passive encounter. When more senses are involved and stimulated, more information is retained (Lewis 23).

Do these factors mean that multimedia technology positively impacts education? If designed and prepared well, then yes. Like any tools used to disseminate information, they must be used properly, and with the students in mind. What educators and content developers must remember is that, like any other type of training, multimedia and

distance education can be the right choice as long as all factors are considered.

Technology is not a magic potion for training; it is, however, a highly useful tool for the right kinds of training and instruction, the right kinds of subject matter, and for the right students.

IV - Has Technology Lowered the Costs of Education/Training?

Perhaps the greatest fallacy concerning the introduction of technology into the learning environment is that technology will cut costs and help the educational providers (both academic and corporate) save money. While using technology can, and often does, increase the reach of training to more students in less time (which in theory should lower costs), the cost of delivering the lesson to the student on a per-student basis does not always favor the use of technology. The reality is that creating a curriculum reliant upon technology (whether on-line or in the classroom) requires a great deal of time, talent, resources, and instructor training - all of which requires money (Giguere and Minotti 15).

When I was creating media-based training for an insurance company in the 1990's, the prevailing attitude was that using technology (video and CD-ROM) to reach all 24,000 employees was something that would save money. The rationale was that a videotape or CD-ROM could be produced, duplicated, and sent to each of the 38 offices at a lower cost than sending out a trainer or manager to each of the offices. In one particular case, it was decided to produce a CD-ROM outlining the new Human Resources policies to all employees. With a budget of \$20,000, I was to produce a product that would be sent out, eliminating the need for travel, printing of manuals and flyers, and man-hours spent in front of selected groups of people. The reality of that

Commentaire : Notice how the student moves from the general statements of the previous paragraph about the cost-effectiveness of technological training to a concrete, personal example. The personal anecdote not only serves as evidence to prove his point, but also helps to engage the reader.

project was that once the CD-ROM was produced, additional costs came to the forefront. Postage of each CD-ROM was costly; additional materials needed to be created explaining the CD-ROM (and the basic information contained within the CD-ROM) for the manager of each office; a teleconference needed to be held to instruct the offices how to navigate and use the CD-ROM; and 21 offices needed to purchase equipment that would allow them to present the CD-ROM in a group setting (rather than having one person at a time use the CD-ROM at his/her own desk). Ultimately, it would have cost roughly the same to send a trainer to each office for a day.

The same issues are arising for companies or schools who create and introduce on-line training. My current company recently spent almost \$100,000 creating and instituting on-line training for our members. The thinking was that we could reach more people with fewer trainers, thus increasing the cost-effectiveness of our training efforts. What we found was that the cost of maintaining and troubleshooting the system, the cost of amending training modules when products changed (or adding modules when new products were introduced), and the constant need for trainers to be available on-line to answer users' questions, made it cost prohibitive based on the number of students who used the on-line training.

Can current training materials simply be placed on-line, and disseminated to students in that format rather than live in a classroom setting? Certainly. Would it reduce costs? Probably. Would it be effective? Probably not. Boud and Prosser argue that it is "overly optimistic" to assume that training materials and learning designs can be context independent (244). In fact, training materials must be created with context in mind. How will the student see it? Experience it? Be able to interact with it? What works live in a

Commentaire : Here, the student uses a rhetorical device known as "epanaphora" (starting a series of clauses or sentences with a similar word or phrase) in conjunction with "climax" (the arrangement of words, phrases, or clauses in order of escalating importance). Stylistic devices like these add beauty and elegance to your papers.

Commentaire : The phrase "overly optimistic" is a direct quote from the student's source. Quoting a salient word or a key phrase is a particularly economical way to use your sources, and saves you the trouble of reproducing long extracts of text that won't necessarily serve your thesis.

classroom may not work on-line. The cost of “re-creating the wheel” will need to be addressed. Rath and Gaudet tracked the efforts of a university to re-format traditional text-based learning for multimedia, and found that “to be effective, . . . an effective design has to be selected, and a suitable delivery environment has to be created” (140). In short, the resources that once went into training (time, talent, money) must now go into re-creating the learning materials.

While the costs of developing and delivering on-line and multimedia training may not be less than traditional training, the ultimate long-range costs based on a delivery and retention ratio per student may indeed make the costs worthwhile. Rath and Gaudet also cite a paper delivered by James Z. Li that indicates that learning via multimedia may occur up to 3870% faster than traditional classroom instruction, while content may be mastered up to 50% quicker (140). In short, multimedia produces quantifiable results, often making the cost factors acceptable. In corporate settings, multimedia and on-line training may allow the student to put into practice the information more quickly, and with better results, than previous training classes. Thus, the student saves time and increases productivity, which saves the company money.

Creating and providing training, whether in an academic setting or in a corporate setting, has always been a costly proposition. The idea that technology will cut costs has been shown to be false. What technology does is redistribute the costs, away from printed and live resources and toward equipment and media-based resources. While this may leave the bottom line undisturbed, in many cases extrapolating the “costs vs. student” ratio indicates that technology, when used properly, is more economical and effective over the long run.

Commentaire : Statistics, when appropriate to your subject matter, are valuable sources of supporting evidence. They give your readers empirical, quantifiable proof that they can digest.

Commentaire : This paragraph acts as a quick summary of the points the student has just finished discussing, giving the reader an opportunity to confirm an understanding of the information the author was trying to convey.

V - Conclusion

Technology in the learning environment can be a powerful and effective tool when used well. This means focusing on four key factors, as outlined by Boud and Prosser (240):

- Engage the learners. Take into account their prior knowledge of the technology and the subject matter.
- Acknowledge the learning content.
- Challenge the learners. Make the learners participate in the materials; make them an active part of the learning process.
- Provide practice. Include demonstrations, feedback, and avenues for reflection on the learning.

It also means acknowledging that numerous resources will need to be committed to the design and creation of technology-based learning. Besides the obvious need for equipment, there is a need for re-design of learning classes and materials; creation and delivery of the materials; technical support for users and instructors; teaching the instructor how to utilize the technology in the learning environment; and keeping the courses, and the delivery tools, up-to-date.

One roadblock in the use of technology is a student's possible lack of computer or technology literacy. This technology anxiety tends to be primarily focused on computer use, and often leads to frustration and despair on the student's part (Kotrlik and Redmann 205). Perhaps this is why the most common form of computer training deals with learning the computer itself (Selwyn and Gorard 8).

Commentaire : Rather than merely summarizing what he has already written, the student takes this opportunity to raise important issues that will impede the spread of technology in the field of education. In your conclusions, it is a good idea to raise questions or potential difficulties for future consideration.

Technology has changed the classroom and the training department in myriad ways. However technology is used to transmit information, the sender (school, business, etc.) must keep in mind the simple fact that technology is only a tool, and is no better or no worse than the planning that goes into it. It is also going to benefit those who are receptive to it, those who perceive that they are getting the benefit of what the technology can deliver (Boud and Prosser 238). I personally have seen, from my vantage points as a student, instructor, and content creator, how technology can enhance the learning experience and can transform the student's perception of what he or she is able to do. Technology, used well, has absolutely changed the way training and education can, and will, take place.

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Commentaire : This student is using the Modern Language Association (MLA) citation format. Depending upon your subject matter and the desires of your faculty mentor, you might also use the American Psychological Association (APA) citation format.

The number of sources from academic journals and the fact that they were all published no more than ten years before this paper was written help demonstrate that the student has met the following ILP standard: "Student's work addresses the competence at a college level of proficiency."

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