

Chapter 4 History before e-Learning

(What is the same as before and what is not?)



Learning Objectives:

Be able to explain the use of media in education before e-Learning while referring to the differences from e-Learning.

Be able to analyze examples of e-Learning by applying those theories that have served as the basis for distance education.

Be able to analyze the characteristics of e-Learning by taking a given example and comparing it with the situation before e-Learning.



Summary of this Chapter

- A variety of advantages of e-Learning have been pointed out. However, what is made possible for the first time with the advent of e-Learning can be summarized as enabling cooperative/collaborative learning with faraway learners, facilitating revision of materials. Other advantages have been around even before e-Learning.
- E-Learning does not have to be constrained to those things that can only be done by e-Learning. For e-Learning, you can take advantage of the know-how accumulated through past forms of education. E-Learning becomes an integrative platform for improved-Learning environment which combines the merits of various techniques.
- The history of the use of media for education before e-Learning includes programmed learning and teaching machine, CBT, multimedia, and WBT. The key phrase was realizing interactivity. In the days of CAI, the basis for simple yet powerful ID was established, including the five principles of programmed learning and Mager's three questions.
- The development of distance education before e-Learning was supported by autonomy theory, industrialization theory, and bidirectional communication theory. On the one hand, as a result of technological development, equivalency theory is proposed, but on the other it is argued that there is a form of collaborative learning which is only possible by asynchronous communication.

Section 1 With the advent of e-Learning, what sort of things were made possible for the first time?

Rosenberg (2002) points out 11 benefits of e-Learning, as shown in Figure 4-1. Are these benefits unique to e-Learning, or have they been achieved before, to some extent?

Figure 4-1: Eleven benefits of e-Learning (Rosenberg, 2002)

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1. E-Learning lowers costs (The significant startup investment can be quickly recovered through delivery savings)
 2. E-Learning enhances business responsiveness (simultaneous delivery → linked directly to speedy management)
 3. Messages are consistent or customized, depending on need
 4. Content is more timely and dependable
 5. Learning is 24/7 (becoming global)
 6. No user "ramp-up" time (because the user is familiar with browser operations)
 7. Universality (using the universal Internet protocols and browsers)
 8. Builds community (it is possible to build enduring communities of practice where they can come together to share knowledge)
 9. Scalability (involves little additional work or cost)
 10. Leverages the corporate investment in the Web (utilization of corporate intranet)
 11. Provides an increasingly valuable customer service (linked directly to stronger external e-commerce)
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Note: The descriptions in brackets are comments contained in Table 2-1 (Rosenberg, 2001), summarized by Suzuki.

One of the merits of e-Learning that people often mention is “whenever, wherever, and whoever.” Rosenberg (2002) also points this out (see item 5 of Figure 4-1). However, the merit “whenever, wherever, and whoever” is not exclusive to e-Learning. Take learning by books or cassette tapes, for example; people can learn even in commuting trains or during business trips. Moreover, they can even learn at a place without electricity. Surely you can stress that e-Learning has, compared with conventional group training, an advantage in that, so long as you have a computer terminal, you can learn “whenever and wherever” without going to a particular place at a particular time. However, that is NOT limited to e-Learning only. As a matter of fact, the catch-phrase, “whenever, wherever, and whoever” has been used by correspondence senior high schools for a long time in Japan as their advantage. This may be meaningful only as an advertising slogan to make contrast with regular high schools. It does NOT mean that “You cannot learn (by yourself by reading books) unless you go to a high school.”

Mayer (1999 & 2001), a learning psychologist who has carried out a number of empirical studies regarding multimedia learning, throws harsh criticism at e-Learning in his recent book “e-Learning and the Science of Instruction” (Clark & Mayer, 2003). He argues that in many cases so-called e-Learning is exactly the same as CBT, which has been around for 30 years, and most e-Learning materials are just reproduction of a book on the screen. According to Clark & Mayer, there are three things which are specific to e-Learning and have potential educational benefits, as shown below (pp. 20-22: these three points are discussed in Chapters 9, 11, and 13 of Clark & Mayer, 2002, respectively):

- (1) Practice with Feedback
- (2) Collaboration in Self-Study
- (3) Use of Simulation to Accelerate Expertise

With the advent of e-Learning, cooperative/collaborative learning with faraway learners was made possible for the first time. In the past, carrying out learning by connecting multiple locations using voice and video images would have been a big undertaking which would not be possible unless it was such a TV-broadcast event as a ceremony celebrating decades of establishment or something similar. However, e-Learning made it an everyday event.

In addition, it is also true that it became easier to revise the materials. I can imagine that there are such things that might not be “things that can only be done by e-Learning,” but the things that are now ready to go and can be implemented because the obstacles which had made them difficult to implement have been finally removed. In short, it means that feasibility has been improved significantly.

On the other hand, so-called e-Learning includes those (many?) outdated learning environments that were harshly criticized by Mayer. If you just put things on the Web, without changing the contents of an old medium, then you may lose an opportunity to make the best use of characteristics of e-Learning. However, e-Learning does not have to be constrained with those things that can be done only by e-Learning. It might not be appropriate to criticize the lack of interactivity saying, “Well, it is supposed to be e-Learning. Then why do they just keep showing the video?” when showing the video-recorded lecture may be the best way. It is sometimes more practical to send to branch offices, those manuals that are frequently revised, in PDF format via the Internet, as opposed to trying to convert them into an e-Learning content where you keep viewing nothing but the computer screen.

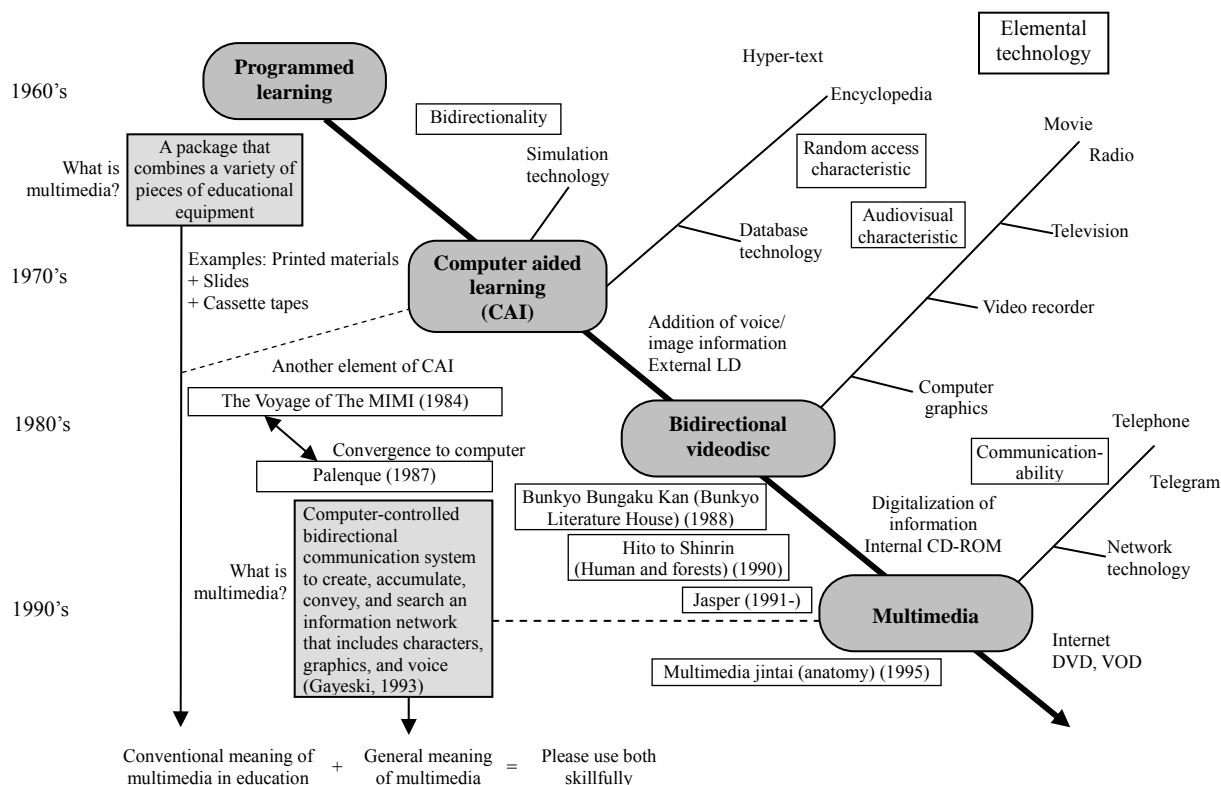
You cannot expect that the use of e-Learning to result in improved effectiveness, unless you follow the fundamental principles of design, regardless of the media you use. Such principles include layout and the format of materials and shooting techniques of video clips. It is necessary for you to refer to the ID techniques that had been developed before e-Learning so that you can assure the quality of the components.

When you design the learning environment of e-Learning, you are required to do so in a comprehensive way incorporating, as an element of e-Learning, not only unique merits brought about by e-Learning, but a range of know-how accumulated through the educational use of media so far. E-Learning should be defined as an integrative platform for improvement of learning environment which combines the merits of various techniques.

What are the merits of e-Learning? You can find the answer to this question by comparing e-Learning with the situation before it (i.e., history before e-Learning). In this chapter, let us go through the history before e-Learning, for the purpose of identifying the merits of e-Learning.

Section 2 Genealogy of the use of media in education

The genealogy of the use of media in education can be summarized as shown in Figure 4-2. In this section, let us firstly go briefly through the time of bidirectional videodisc material and multimedia material, then go back retrospectively to look at the time of programmed learning and CAI. What would be your impression of the past when you review the words and actions of these times? Would it be “Time repeats itself,” or “Learn new things by applying old things?” Let us look for something which we can make use of for e-Learning.



Source: Suzuki, K. (1997), 'Chapter 3: Multimedia and education' in K. Akahori (Ed.), "Schools in a highly informationalized society – Aiming to establish the most advanced school", Gyosei, pp. 73-104. [In Japanese]

Note: This diagram was created in 1997. Recent grouping of materials is called “Multimedia” in accordance with the title of the chapter “Multimedia and education.” Use of the Internet, etc. is suggested to be an extension of it. Some readers might remember that, in the middle of the multimedia boom which happened immediately before the Internet boom, there was a huge corner in the bookstore where all kinds of books which had the word “Multimedia” in their title were laid out flat. If I should revise this diagram, “e-Learning” would be placed into a position after the multimedia.

Figure 4-2: Flow of multimedia materials and the development of elemental technology

4-2-1: The age of Multimedia

While I was studying in the US (1983-87), studies on instructional materials which took full advantage of images and video pictures made headway, thanks to the laser disc, which was the most advanced technology at that time. Later on, in the 1990's, multimedia went mainstream after the use of personal computers with internal CD-ROM drives became a part of our life. In one of the books for beginners introducing what was going on with regard to multimedia at that time which contained a lot of samples of popular applications in a CD-ROM attachment (Tway, 1995), six areas of multimedia application are discussed. See Figure 4-3 for trends in each area (Suzuki, 1997).

Figure 4-3: Areas of multimedia application and trends (Tway, 1995)

[1] Education (school education)

Presentation of information in a variety of forms and nonlinear learning is expected to be more effective in dealing with differences between individuals. The use of multimedia is getting more and more popular not just at school, but at home as well. In addition, "edutainment" (education + entertainment) in which elements of entertainment are added to education is being rapidly promoted.

[2] Training (business and industry)

The use of multimedia is getting popular in corporate training for the same reasons as in school education. The use of multimedia has saved a large amount of time and improved cost effectiveness, particularly training for new employees and human resources who have little experience in the areas of business and medicine. There has been an enhanced benefit, because people can do both work and training at the same time; not only can the training be offered in accordance with needs, but they also do not have to gather together at a training center.

[3] Information access

The CD-ROM, as it can store 600MB of data, is being actively used for such things that contain a large amount of data as literary works, encyclopedias, and other reference books. Although early versions of these products had only such limited interactivity as keyword search because they mainly dealt with character-based data, recently more and more products have enabled search of multimedia information in a comprehensive manner and in a short time.

[4] Sales and marketing

In old days, promotional video tapes for sales were outsourced to specialized companies. However, as it became possible to easily produce multimedia reference materials for advertising/presentation thanks to the development of desk top presentation (DTPR) software, you can carry these materials in your laptop computer for the purpose of presenting products, etc.

[5] Entertainment

Starting from Nintendo's Mario Brothers, the world of multimedia games has been satisfying the entertainment needs of the people regardless of age or gender. All kinds of cutting edge technologies are used for entertainment products, from joysticks to headsets that give you the feeling of virtual reality.

[6] Electronic book

Starting from “hyper novel” in which the ending changes for each reader, multimedia has made it possible for future literature to have a totally different approach from before. In addition, it has such function that helps the reader to understand the work in depth; for example, by displaying the related background information if required and “reading out” picture books in different languages.

Source: Suzuki, K. (1997), ‘Chapter 3: Multimedia and education’ in K. Akahori (Ed.), “Schools in a highly informationalized society – Aiming to establish the most advanced school”, Gyosei, (Table 3-4).

Gayeski (1996) listed up the following five points as advantages of multimedia in the field of education. The first advantage is the support of individual learning. With the use of multimedia, individual learning can adjust to a variety of needs such as the level, pace, and style of the learner, or the language used by the learner. The second advantage is integration of learning and evaluation. It is pointed out that you can record personal history as a score while learning takes place. The third advantage is that it is possible to introduce proactive learning strategies. Learners can participate in not only passive memorization, but also active knowledge construction. The fourth advantage is that it makes realistic virtual reality possible. Multimedia can stimulate the learner both intellectually and emotionally, because it can provide a realistic environment for discovery and collaborative learning. The fifth advantage is speedy access to high-density data. It is possible to inexpensively copy and deliver to the classroom a large quantity of data in a variety of forms, which in the past were found only in limited places.

On the other hand, she listed such impediments to the utilization of multimedia as low design quality, lack of hardware standards, classroom tradition, costs associated with and time required for material development, and concern about attenuation of relationships between people. She had pointed out that there were not a small number of products which were, because of lack of experience, either made by just putting the existing materials onto computers, or no better than the clumsy encyclopedia (somewhat similar to the recent scathing criticism of the e-Learning). In addition, one of the serious problems at that time was the problem of hardware environment, in that it was not necessarily clear if the software could be used in the existing environment, although (fortunately or unfortunately) this problem has become less critical these days.

Gayeski (Gayeski, 1996) had referred to not just the advantages and disadvantages of multimedia itself, but also the following four impediments that are associated with classroom tradition:

- (1) Lack of training/facilities/reward system that ensures the teachers who are accustomed to teacher-led/time-bound type of teaching to become developers of multimedia materials and/or supporters of multimedia learning.
- (2) In terms of costs, as compared with the reduction of hardware costs, the time/labor/costs required to design/develop the software have not been reduced.
- (3) Development of material cannot catch up with the rapid change of learning content because, although demonstration versions look fantastic, it takes a long time to develop a material that is good enough for practical use.

- (4) People are concerned that “when multimedia is used, students would have less opportunity to learn human interaction,” because they are strongly prejudiced to think that multimedia is a material for individual learning rather than a supplementary tool for the teacher or a tool for cooperative learning to the extent that they fear that multimedia would interfere with interaction between human beings.

Are these also very relevant to e-Learning these days? Or, have these problems been diminished as a result of widespread use of broadband? I wonder if “classroom tradition” itself is also changing as a result of rapid progress of IT in society as a whole? If schools are difficult to change, then what about companies? I wonder if they are the same or different?

4-2-2: The age of programmed learning/teaching machine/CAI

When you further go back from the digital age typically represented by multimedia, you will find the analogue age. There existed CAI (Computer-Assisted Instruction, also called CBT or Computer-Based Training) and programmed learning as CAI’s headstream (see Figure 4-2). Computers also existed in the analogue age (although it sounds strange). However, they were very expensive and just one of the options of educational equipment rather than serving as “a window to integrate all the media” or “a communication medium.”

Multimedia also existed even in the analogue age. However, the term did not mean “a computer which realizes all the media in a virtual manner,” but meant “to utilize the multiple (not single, but multiple) pieces of educational equipment by combining them together.” Even today, sometimes; for example, at some museums, we come across an audiovisual presentation where multiple slide projectors (for example, 3 by 3 making 9 projectors or 4 by 4 making 16 projectors) are combined together with voice. At that time, this was the most advanced form of “multimedia” presentation.

In a famous immaterialized episode, which people today are still talking about, Edison, the inventor of motion pictures, predicted that in the future all manners of education would be replaced with movies. Education by broadcasting and audiovisual education were initiated and developed as an area where they studied how to utilize, in education, those new media which have come on scene one after another such as radio, television, OHP (over-head projector), concept film, LL (language laboratory), and VTR (videotape recorder). It was the time before the analogue age which is included in Figure 4-2 that the theories such as E. Dale’s (1947) “Cone of Experience” were born.

The ascendance of behaviorist psychology in the 1960’s helped people to take up the programmed learning and teaching machine which had been proposed before. It was said that B.F. Skinner, a famous scholar of behaviorist psychology, was stunned, when he observed his daughter’s class, to see his daughter passively listening to the explanation given by the teacher, which went on and on. Feeling “you cannot make learning effective in this passive way. I would like to endeavor to establish such a learning environment where the learners give active responses and the teacher gives feedback to them straightaway,” he promoted the use of programmed learning and teaching machine in education. He argued that such an environment where the learners interact more actively must be established to create a learning environment that reflects the findings of the behaviorist psychology research at that time.

Programmed learning means a type of learning that uses those materials to present questions that are arranged (programmed) in such way as to let the learner achieve an educational

objective step-by-step. Being a mechanical device in which programmed learning materials are installed, the teaching machine was used, for example, to prevent the learner from seeing the correct answer before he/she entered his/her answer, or to provide, as a next step, a branching out where a different question is given in accordance with the nature of the answer. These, by being computerized later on, became the origins of CAI.

It was programmed learning and ensuing CAI-related studies that gave birth to educational technology. The research of programmed learning was the mainstream study at that time to the extent that the term “educational technology” brings up the image of programmed learning research. Based on the research related to the programmed learning, those five principles were proposed as shown in Figure 4-4. I wonder if these principles can be applicable to e-Learning these days.

Figure 4-4: Five principles of programmed learning

Principle	Details
Active Response	Judge the degree of understanding of the learner by letting him/her answer some questions. Think that you are not able to know the degree of progress until the learner expresses it.
Immediate Confirmation	Let the learner know immediately whether or not his/her response was correct. Always ask the learner give the next response only after he/she is told whether or not his/her first response was correct.
Small Step	Divide the learning process into as small steps as possible so that the learner does not have to fail. Think that there is a danger of the failure becoming habitual.
One’s own Pace	Let the learner learn at his/her own pace. Think that the appropriate speed differs from learner to learner.
Learner Verification and Revision	Judge the success or failure of the program by the actual result of the learning rather than letting experts decide. For this, ask volunteers who have not learned the program being developed to try it out. Then improve it if necessary.

Note: This is a summary in Azuma, H., et. al. (Eds.) (1979), “New educational dictionary”, p.720.

In behaviorist psychology, the number of exercises to make a response in a set of conditions is thought to govern the effectiveness of the learning. It is also thought that feedback must be given to the correct responses to “reinforce” them, and individual learning should be the basis for ensuring such learning process. This idea is reflected in principles 1-4 in the five principles above. The last one, “Principle of Learner Verification and Revision,” is the viewpoint which, I think, is the most important contribution of behaviorist psychology to the empirical approach in pedagogy. This viewpoint, even now, is inherited in the idea of “formative evaluation” or “feedback and improvement” in the ID process.

The approach to improve learning environment based on the findings of psychological research has its inception in this behaviorist psychology. The idea is that you can support learning better by studying the learning mechanism. This is the outcome of the research that resulted in the present ID model/theory. In addition, it is appropriate to think that employment of the systems approach in the ID process also has its inception in the “Principle of Learner Verification and Revision” at the time of programmed learning. The significance of their finding that this attitude of developing practicably usable materials based on data cannot be overemphasized.



Column: Roblyer's opinion and requirements for CAI manuals



One of the methods to improve the quality of material is to apply systematic design procedure (ID process model). CAI materials are expected to help the learning at a level that has not been possible by conventional methods. To achieve that, it is necessary to review the way you develop the materials. There have been many research studies related to the characteristics that high quality materials should possess or procedures to develop such materials. However, as a matter of fact, the results of such research have not been applied to the development of CAI materials as widely as they should have been. While the US was the center for CAI research at that time, **Roblyer (1987)**, an ID researcher who was active in Florida, pointed out the following:

If your intention is to fundamentally improve the image of CAI possessed by teachers or outcome of the CAI research, it is necessary to improve the quality of the courseware, which should be the main task in this field (CAI research). (Snip) One of the largest obstacles that prevent the employment of systematic design procedure would be that courseware sells well (at least temporarily) regardless of its effectiveness. This might have been interpreted, by many courseware developers, as a message that whether or not the courseware is designed well is not so important to educators.

Source: Suzuki, K. (1988), 'Introduction to CAI, 3 - Requirements for easy-to-use CAI materials (Series: Computer literacy for teachers, No. 20)', "Instruction and evaluation", Nov. 1988, pp. 43-47.

When I visited my alma mater (Florida State University) in March 2003 after a long time, I was invited to a house party where I met my mentors. At that time, when I mentioned the popularity of ID I had witnessed at ASTD TechKnowledge 2003 (see Preface), many of my mentors made skeptical comments; for example, "Well, there are many kinds of ID. I wonder what kind of ID they are doing." There seemed to be dissatisfaction that there were not many practitioners who put the results of the studies into practice correctly and firmly even in the US. US was supposed to be the center for ID and there were so many specialists who called themselves instructional designers. In that sense, the situation which was pointed out by Roblyer might not have been changed very much even then (Note: In my opinion, the researchers have to bear half of the responsibility for this. Isn't the reason for this problem that they have not provided usable tools to the practitioners?)

I proposed during the time of CAI that we should improve documentation. Let us take a CAI material; for example: what kinds of learners are expected to use this material; what is the purpose of offering it; how is the material constructed; how can the user use it; what sort of effectiveness could the user expect? The first step for developing a high-quality CAI material is to let the user know such items as listed above before opening the package of CAI. However, the reality is that this kind of basic idea has not become a matter of common sense for commercially available CAI materials.

- (1) To be able to show clearly that "This CAI is like this" is not just a benefit for the user, but a sign indicating that the material is trustworthy.
- (2) By using the product while keeping the intention of the developer of the material in

mind, it becomes easy for the user to judge what is bad; the CAI itself or the manner in which the user uses it.

- (3) Although when it comes to print materials, we can check the content by skimming them. CAI do not have this advantage. The role of “documentation” attached to the CAI material is to supplement this disadvantage.

Based on these three viewpoints, I proposed that we should expect the following items from the “documentation” of the CAI. I wonder if these points are still valid for today’s e-Learning materials.

Figure 4-5: Items which should be included in the “documentation” of the CAI material (Suzuki, 1988).

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- a. Objectives of the material (What is this CAI for?)
 - b. Learning objectives (What kinds of things is the user expected to be able to do; under what conditions?)
 - c. Examples of assessment questions (clearly state if the test is included in the material)
 - d. Targeted learners (school year, prerequisites knowledge/skills, and general characteristics)
 - e. Equipment and materials required
 - f. Situation of use (environment of use, manner of use, relationship with group instruction by the teacher)
 - g. Recommended way of implementation (recommended pre and post learning activities and/or examples of instruction)
 - h. Structure of the material and how to use each part of it (including objectives and example assessment questions for each part)
 - i. Method of instruction and example screen displays
 - j. History of material development, and the results of field trial and the areas which have been revised.
 - k. Possible areas for improvement and its procedures
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Source: Suzuki, K. (1988), ‘Introduction to CAI, 3 - Requirements for easy-to-use CAI materials (Series: Computer literacy for teachers, No. 20)’, ‘Instruction and evaluation’, Nov. 1988 (No. 11, vol. 34), pp. 43-47.

As compared with conventional materials, items required from “documentation” are considerably strict; this means that the level of quality required of CAI materials was high, and this means no other than the fact that the potential of CAI was high. Put simply, CAI was required to make learners be capable of doing certain things. The reason why I asked such questions as; who are the target learners who can do what sort of things and cannot do what sort of things; what are the learning objectives; what are the evaluation questions to check that; and how many learners achieved the objectives to what extent as a result of an actual field trial of the CAI material; was that I wanted to make it clear what the learners would become able to do by learning this CAI material. If such way of thinking (i.e., of ID) had become widespread in the days of CAI, the quality of materials for e-Learning could have

been better. In other words, the way of thinking of ID has already been firmly established in such places that have a tradition of developing worthwhile materials since the days of CAI.

In comparison with CAI, for example, what about workbooks based on textbooks? The points you should check to see if the quality of the workbook is high are the following two points: firstly, whether the workbook corresponds to the content of the textbook, and secondly, whether the workbook is appropriate for the conditions of the children who use it. Therefore, nobody would ask such questions as “What sort of mark can the children who studied with this workbook score for the comprehensive quiz at the end?” Nobody would think that the reason why the test results were bad was that the way the questions were arranged incorrectly in the workbook. Instead, we might think that the ability of the child was not good enough or the child did not work very hard. In other words, we do not expect the users, by just studying the workbook, to become able to understand the content of the textbook or achieve the learning objectives shown in the curriculum guidelines. Contrary, we would expect that for CAI. This is a big difference.

4-2-3: Mager’s three questions

During the days of CAI, the most straightforward expression that represents the way of thinking of ID was established: Mager’s three questions. About the time when ID process was actively discussed, Robert F. Mager, an American researcher of educational technology, pointed out the importance of the three questions (Mager, 1974):

- Where am I going?
- How do I know when I get there?
- How do I get there?

The first question is concerned with where you are going, how you clarify the goal of the course. What sort of learning by the participants are you going to support? The second question is concerned with how you clarify the method of evaluation to judge whether or not the objectives have been achieved. If our objective is “to climb up to the summit of Mt. Fuji,” then it is clear that “We have come to the point marked the summit of Mt. Fuji, so we have achieved our objective.” However, if the objective is to help the participants learn, it is not as simple as mountain climbing. You cannot look into one’s head; therefore, you have to work out the evaluation method, in advance, of how to confirm whether or not the participants have achieved their learning objectives. Lastly, the third question is concerned with thinking how to make the participants reach the goal of the course. Once the goal is clarified, you can work out the path to the goal. There are many paths that lead to the goal, just as there are many routes to the summit. You have to work out the way in which you help as many participants as possible to get to the goal safe and sound, by developing effective materials and applying your best methods.

As Mager pointed out, the state in which three elements; i.e. objective, evaluation, and method of the course, are all there and well-balanced is called a state of “congruence,” which is considered the most important indicator of ID. In other words, you check each element by making comparison with other two; i.e., To check whether or not plans of evaluation or teaching method is appropriate, always keep the congruence to the objective in your mind. You keep checking, from the congruence point of view, whether you are confirming the

achievement of the course (evaluation) on the basis of the goal of the course, or whether you are preparing the learning activities and teacher's instruction process on the basis of the goal of the course. By being aware of this congruence at all times, it becomes possible to prevent misfit between the objective and delivery and design the next delivery while always taking into account to what extent the objectives have been achieved.

Although it is a local example, when I explain congruence in my lecture, I always mention "Three-colored *monaka* (a Japanese sweet consisting of three colors of sweet bean paste in a wafer shell)", a famous local product of Sendai. With this product, you can taste three kinds of flavors by eating just one of them, because the product contains three kinds of sweet bean paste; i.e. sesame, red sweet bean, and powdered tea. I tell the students that objective, evaluation, and instructional strategy can be seen as three ingredients of three-colored *monaka*. Lack of any one of them would indicate the ID planning document is defective. In addition, I point out that, as the production of each ingredient is made possible by a particular set of techniques, the students have to learn each of the techniques to develop ID capability so that they can aim to develop a well-balanced set of capabilities. All are the musts: a capability to clarify the objectives, a capability to work out the operation of the course, and a capability to evaluate the course.

Among three capabilities, the capability to evaluate the course seems to have been taken lightly in the past. For instructional designers, it is very important to learn test construction technologies. It is indispensable as a technique to evaluate the success of your own course, check it on the basis of the objectives, and improve the course. Nevertheless, I wonder how many of those involved in training courses are confident enough to develop, by themselves, a test to judge whether the learning objectives have been achieved in a precise and appropriate manner. Preparation of evaluation questions including preparation of questionnaire and observation items is mostly of a technical nature rather than an area that tests the experience-backed creativity of the person in charge. I strongly think that anyone who wants to become an instructional designer should try to take any opportunity to learn technologies related to test construction.

Suzuki (2002) is a textbook which tries to teach, even in the days of e-Learning, the know-how cultivated in the days of CAI as a basis for ID^[1]. The passage below typically shows the author's insistence, which is so strong that it almost becomes an obsession. The simplest and most powerful ID concept was born in the days of CAI. In my opinion, we should cherish it even in the days of e-Learning.

[1] In "Material design manual" which was written as a textbook for 'Education Method', a specialized course in the pre-service teacher training program of which I was in charge; the ID basics are taught through 'experience by oneself to develop materials for individual learning using printouts.' Detailed know-how is explained in Chapter 3 'Clarifying the area of responsibility: In-out doorway' and Chapter 4 'Preparing the test.' In addition, for the purpose of development of evaluation related capability, I recommend that the students start with the following books.

- Ikeda, K. (1992), "Science of tests – to all those involved in tests", Nihon Bunka Kagakusha [In Japanese]
- Kajita, E. (1992), "Educational evaluation (2nd edition)", Yuhikaku soshu [In Japanese]

I wonder what the most basic thing is for the prospective teachers in pre-service teacher training program in the area of educational technology, which keeps changing rapidly. Let you experience developing the materials to support self learning, or preparing an instruction plan for group instruction. Let you experience developing paper-based materials, or developing materials that use video or computer. Which one should be first? The formers, yes, I think so. Through experience in developing your own materials, you can realize how powerful yet difficult it is to be empirical, and think about the limitation of instruction in which a human being is NOT involved. Many challenges would arise if you try NOT to utilize media, which would teach you how media could be used effectively, or to try to communicate to the users on paper, which would teach you the value of direct communication. You could also notice the contradiction of such contemporary educational tasks as nurturing capability to utilize information and independence of learners, while keeping the tradition of classroom lessons that are too organized and delivered by those teachers who are too nice to try to teach everything to their students. You could obtain the know-how of teaching better by first trying to teach without directly teaching by yourself. I think that the significance of the approach to first give you experience to design a paper-based material to support self learning (using the textbook “Material Design Manual”) today lies in these areas. (Suzuki, 1996).

Moreover, in my lecture, I mention one more thing, which is the timing at which you prepare the sweet bean paste for *monaka*. That is, unless you have all three kinds of sweet bean paste ready, you cannot complete the three-colored *monaka* product; i.e., an ID-designed document. In the systematic ID process, you prepare the test before you deliver the course. This is called design of evaluation, which requires, in advance, preparation of measures to confirm the quality of the course (in many cases includes tests). It is not until the test preparation is completed that you can answer to one of the three questions, “How do I know when I get there?” At this stage, it is considered that all three kinds of sweet bean paste are ready. The ID planning document includes three elements, “design of the objectives,” “design of evaluation,” and “design of teaching method.” It is particularly important that Mager’s three questions point out the importance of preparing all of them in advance.



Column: Visit to Nihon Unisys Learning Co.



I would not have any hesitation in mentioning Nihon Unisys Co. Ltd., among other companies in Japan, as a typical organization which stresses the importance of accumulation of know-how in the past and utilizes it in providing services today. Nihon Unisys established its education division when the company was founded because, for one thing the company needed to provide introductory training to its customers for the purpose of selling computers. Since then, the company has experienced all the genealogy of the use of educational media explained in this chapter. Moreover, by applying what has been accumulated all these years since its inception to the situation of the time, the company has been pursuing “The best form of training to support self-studying learning,” even from before the notion of self-study has finally become an object of attention in the age of e-Learning.

The education department, which inherits years of tradition, was separated from the mother company in April 2002 to become Nihon Unisys Learning Co. Ltd., which has taken over the tradition of the Self-studying Learning Center. There you can observe, in addition to the most recent WBT materials, paper-based self-learning materials which were developed at the time of programmed learning still alive and kicking. In a small room, where I was told, “We manage a large-scale operation using more than 100 personal computers in the first half of the year when there are a lot of needs, including a new employee training program,” I found one desk for a resident advisor, 10 or so PCs, and a shelf-full of paper-based materials, waiting to be selected by trainees based on their own needs. It was a visit on a rainy day in August 2003.

While fighting against such prevalent ideas that instructors should explain things to the participants in the training course, they design and provide appropriate materials for the course, because they believe that the training should be handled by the trainees themselves according to their needs that vary. Their belief is firm that their role is not to run the training sessions, but to provide learning environment, in which the learning would effectively take place as their customers initiate their own training. They have been firmly maintaining their system to ask their customers to book the self-studying learning room, in which those customers who want support or customers who want to secure a block of training time to concentrate on training. During the reserved time slot, the trainees can learn whatever they need to learn using individually selected learning materials at any pace.

On the one hand, there have been negative responses from the first time customers saying “How in the world can you charge fees while you tell me that I have to learn myself! Aren’t you teaching me anything?” On the other hand, however, there has been support from some companies which kept sending their employees to this learning center for many years, commenting, “Not only does the training go effectively, but it is also good in the sense that we can nurture an attitude to take responsibility in their own learning.” Some participants felt so happy that one of them commented, “I used to get bored when I took training courses, because I was always sort of ahead of the pack. This time, although I thought that I would get bored from day one before I came here, I was able to go ahead with my learning very quickly at my own pace. It was such a fulfilling time that I felt that time passed in a flash.”

This visit made me firmly believe that the fire keeps burning for the self-studying learning room. The experience as an advisor of the self-studying learning room would be useful for coaching in the age of e-Learning. Students from our university who accompanied me were surprised to see the pretest and commented, “What a large quantity of questions I have to answer to start with! I am afraid that my true ability would be exposed” after being immersed in the WBT material for “Introduction to C language” which they were allowed to try.

Section 3 History of distance education

4-3-1: Four theories which support distance education

IT environment including the Internet has changed considerably, there have been various types of schools established that do not require physical attendance. This kind of education is generally referred to as “Distance Education.” It is now possible to study all kinds of courses starting from a high school course to a Ph. D course on the Internet. In the midst of such transformation, Simonson (1999) published a paper which analyzed how people in the first place have theoretically understood distance education in the past. According to Simonson, three theories have historically supported distance education.

The first theory that has been supporting the distance education is the **autonomy theory**. This theory understands the distance education from the viewpoint of “distance” and “autonomous learning.” There have been various efforts trying to overcome the handicap of “distance” by interactivity (dialogue between the student and the teacher) and flexibility (responsiveness) of the program. In other words, it is argued that, to complement the “distance” in distance education, there are two important points: (1) how to ensure the dialogue between the student and the teacher, and (2) whether you can provide a program that is responsive to the needs of the students.

At conventional attendance-based schools, students can learn passively with the initiative taken by the teacher. However, students who learn through distance education have to accept the way of learning where they are responsible for the process of their learning. In other words, “autonomous learning” is indispensable for distance education. Here, the teacher is not so much as an instructor but a responder, where the relationship should necessarily be formed in such a way that the student learns independently and the teacher gives advice when asked to do so (i.e., does not give advice unless requested or needed).

However, there are many people who are not able to learn autonomously and need such advice from the teacher as, what sort of objectives they should have, what sort of references they should use, or how successful their learning has been. Here, we can identify that one of the conditions for success of the distance education is how to educate those learners who cannot learn autonomously so that they become autonomous learners. This point is applicable not only to “correspondence education,” which operates mainly through postal mails, but equally to distance education in general, including e-Learning.

The second way of viewing distance education is **industrialization theory**. This theory considers that the conventional way of classroom teaching based mainly on oral instruction given to a group of students is the education style of pre-industrial revolution. It became possible, by using distance education, to standardize education, provide more learning opportunities, and improve cost effectiveness. From the standpoint of industrialization theory, the concept of distance education could also be a product of the industrial revolution, having such characteristics as “separation of labor,” “use of tools,” “assembly line,” “mass production,” “standardization,” and “integration and centralization.”

On the other hand, it has also been pointed out that the current public education itself, which was established hand-in-hand with industrialism, has been operated based on the theory of industrialism. Certainly, compared with the learners at a distant place who work with the textbook and workbook in silence without communicating with other learners, the learners

who gather together in a shared classroom and listen to the voice of the teacher on the spot to study might look more humanlike. However, what about the reality? There are classes that just keep doing cramming operation mechanically in silence mainly as a preparation for entrance examination. In other classes, students spend their time in such relationship as “they are my classmates but not friends.” Such teaching method aiming to improve each other by exchanging one’s own opinions is rarely employed. Yet in other classes, the flow of information is always one-way from the teacher to individual students from the beginning to the end (Is it different from reading a book?). If these are the reality, then you might not be able to positively claim that distance education is industrialism and classroom education is not factory-type education.

The third theory is **bidirectional communication theory**. In this theory, distance education can be identified as “guided educational dialogue.” The effect of distance education can be explained by “feeling of oneness/sense of solidarity” based on dialogue or discussion between the teacher and the learner that happens in the course of learning. For distance education to be successful, it is claimed to be necessary to support the motivation of the learners, encourage the pleasure of study, and make the subject matters meaningful to the learners. This theory takes the stance that it is possible to promote communication to or from the learners. It can be established when the teacher and the learner can understand each other and enhancing the sentiment to face the materials or actively participate in various activities, debate, discussion, and so on.

The center of distance education would have been the time spent on learning a certain thing in other ways EXCEPT through interactions with a teacher of flesh and blood (otherwise it is conceivable that distance education itself was impossible). It may not in such situation that your teacher knows you, and you know your teacher personally. Even if textbooks and workbooks were written by a certain author and the content was a medium to skillfully convey the feelings of the author, it would still be difficult to establish a personal relationship with the author (Note: Nevertheless, when you read my work, I would like you to think “Oh, look, this passage is written by Prof. Suzuki”). For this reason, it is important that the teacher in charge, a human being of flesh and blood (a person who plays a role of facilitator or mentor, who may not necessarily the author him/herself) stand between the learner and the material and form a bidirectional relationship. The bidirectional communication theory is stressing this point once again.

Based on the three theories mentioned above, Simonson (1999) proposes the **equivalency theory**. He argues that we should put an “equivalent value” to all manners of educational experience, regardless of whether it is distance education or attendance-based education. Distinguishing what is distance education and what is not make less sense, since a virtual distance education environment (such as a virtual classroom) has been made possible thanks to the development of communication technology.

According to him, although learning experiences would take various forms depending on the environment, we should design the learning environment in such a way that they come to have an equivalent value as a whole. Here, to aim to become equivalent means having “the same value” rather than “the same form.” It is possible for the teacher and the learner to communicate with each other, even if they share neither the same place nor the same time. The stance which does NOT regard distance education as “something that is not normal, or of secondary choice” or “something which is different from the ordinary school” is stressed.

If information and communication technology used for the distance education makes advances, one day we might be able to realize such a distance education environment in that you don't have to be aware of even the fact that you are very far away, because it is so real and so close. The number of students that a teacher of flesh and blood can deal with, regardless of whether or not it is distance education, cannot be infinite. However, if such device that can perform like a teacher of flesh and blood is realized in the future, it might be possible that even this would no longer be a constraint.

This theory motivates us, instructional designers, in such way that we feel that we are challenged to design a learning environment for e-Learning which has equivalent value with face-to-face group lesson. What can we do? How can we combine this and that to achieve the equivalent value? In the past, distance education existed as an inferior option for those people who unfortunately cannot attend the school. However, take correspondence high school for example, increasing the number of people now choose the correspondence school (you go to the school only once for weekly schooling) for positive reasons (such as dedicating more time on music or writing novels). It is because they feel it is waste of time to go to the attendance-based school (you have to go to the school every day). (Note: Although the number is increasing, they are not yet the majority. The majority of them are transferred/moved from the attendance-based school). I can imagine there is a similar situation for adults. It is possible to design such an e-Learning program or a distance education system that are chosen for positive reasons by those who require more flexible, more effective distance education.

4-3-2: Things only distance education can do

There are things which can be achieved only because the education is distant or asynchronous. Professor Harasim of Simon Fraser University, who was involved in the establishment of Phoenix Virtual University (the lady who appeared in Episode 2 of the Preface of this text), stressed "the meaning of asynchronous" in her keynote speech for an international conference held by the Korean Society of Educational Technology (KSET2003). Pointing out that there are three kinds of online learning, (1) online collaborative learning, (2) online distance education (online version of correspondence education), and (3) online CBT (online version of individual learning), Professor Harasim said, from the stance of supporting online collaborative learning, that people should not mix up these three. For example, the discontinuation rate is not high for (1); this is the problem only for (2) and (3).

Harasim argued that with the first type; i.e., online collaborative learning, such collaborative learning can be made possible that cannot be possible in a classroom environment where students share the time and space.

With online learning, every one can say something, because it's asynchronous. Unless you say something, you are not considered to be participating. However, in a face-to-face environment, only a limited number of the people can say something, because people are prevented from doing so for a variety of reasons. With online learning, being asynchronous means a lot. People can be treated equally so long as they think something, taking whatever time necessary for them to think, and say something about what they think, regardless of whether it took long to think, whether the person is a man or woman, or whether the person is shy. There people learn actively, thinking deep.

Note: This is an extract from the speech, rearranged by Suzuki based on a memo. Although the nuance of the speech was something like this, reliability is not very high.

All the participants say something and have a discussion around a certain topic. They have to think deep, before they can write something on the discussion board. When they think deep, they come up with some creative ideas; as a result, the problem solving ability of each participant is improved. Considering that such people who had difficulty in saying something in the conventional face-to-face synchronous environment can have equal opportunity to say something, the total number of ideas would be greater. If that is the reason why we should try learning in a distant and asynchronous environment, I would like to take advantage of that merit. Being an instructional designer, I wonder, what sort of topic should be good in terms of encouraging active discussion, or who should intervene in what situation and in what manner to make the discussion more meaningful.

The online collaborative learning recommended by Professor Harasim would probably be effective as a methodology for such business requirements as development of high-level problem solving capability and cooperativeness, or training of leadership, all of which are expected to be achieved by e-Learning. On the other hand, acquirement of skills and knowledge which are the basis for these and development of the ability to access information, for example, are areas in which such techniques as online correspondence education or online individual learning should be utilized to its full potential. Instructional designers are also required to work out what is the best way to combine these three modes of distance education to make the overall program most effective.

In the same manner as with the history of use of media in education, there are so many things in the history of distance education that we can take advantage of in e-Learning. Isn't it nice to be able to wisely use inherited assets from the past in today's situation and in the future?



Column: Paradigm shift in education by distance education (OECD)



In “Learning revolution: Information Technology changes higher education” compiled by OECD, it is pointed out that there is a possibility of paradigm shift in education by distance education. It indicates that the basic issue regarding the fundamental nature of the distance education is not the issue of distance, but the concept of “self-Learning with guidance,” which is relevant to both face-to-face education and distance education; and this concept will bring about the possibility that teachers redefine their roles.

“Nowadays, instead of thinking that being a student of a part-time school or distance education is a disadvantage, teachers have to renew their awareness. The issue is what sort of benefits IT technologies bring about not only for the students of distance education, but for all students, including full-time students and students of face-to-face program. Teachers, instead of considering the education method called distance education to be a next-to-best solution, should review their educational techniques which they insist on, and ask themselves in what persuasive manner they can provide their instruction.” (OECD, 2000, p. 94)

“Teachers of face-to-face educational institutions can learn many things from teachers of distance education who feel strong responsibility for giving such instruction that can make their students succeed in achieving the learning objectives they set” (OECD, 2000, pp. 125-126)

It is no longer acceptable to take such attitude, as a person in charge of face-to-face education, that all you have to do is just “talk” aimlessly. As an instructional designer, I feel very happy that such a time has come. It is no longer good enough for the shift to e-Learning to mean just videotaping the lecture and posting it on the Internet. These are getting obsolete unless they are done for some archival reasons to show that there used to be a time when such kind of lecture existed (and was allowed to exist). It would only be justifiable similar to the reason why they videotape traditional culture which is threatened to disappear, for the purpose of preservation. It is possible that the shift to e-Learning will become an important turning point as a detonator to reexamine whether such worthwhile lectures that are not like that have been delivered on a daily basis and try to work out the way you increase the value of the lecture itself (or let them realize that they cannot go on like that). This is particularly true for those people who have been delivering “those lectures that are so embarrassing that you do not want other people to see them ” (Note: You know that some people turn their backs because I make this kind of remark. However, this is another merit of asynchronous/non-face-to-face paper-based media that allows me to say such things that I wouldn’t dare to say face-to-face, isn’t it? In addition, it’s in the “Column”, you see?).

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	End of chapter report assignment (Chapter 4)	
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Write a report on one or more of the following three assignments:

- 1) Summarize your questions, comments, opinions, and impressions you had after reading through this chapter (Chapter 4). In addition, if you have any experience, additional information, or have done research (do not forget to name the source) in relation to what is written in this chapter, you are encouraged to include them in your report so that you can extend your understanding even further.
- 2) Analyze what are “those merits that are specific to e-Learning” and how they are put into practice based on the examples of e-Learning which you know. When doing that, you are required to mention Figure 4-1: Eleven benefits of e-Learning. In addition, by making contrast with e-Learning examples, you are also encouraged to analyze your experience in terms of how you have been educated at school and at the company or educational activities you are doing now.
- 3) In relation to the pre-e-Learning education which you know, list those items that are forgotten now but of which you strongly want to come back in the future, giving the reason why you want them to come back. Also discuss the possibility of whether they can really come back.