The Lecture and Instructional Design: A Contradiction in Terms?

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The lecture is the second oldest form of instruction known to man. It was invented the day after he learned to talk, and has been one of the mainstays of his instructional world ever since. The ancient Greeks used it, Roman education was based on it, the great universities of the Middle Ages were grounded in its precepts, and it has even survived the invention of the printing press. It has been glorified by teachers as the greatest professorial instrument at man's command, and roundly damned by countless generations of students who have perceived it as Satan's own instrument of educational torture. Still, it is the most widely used form of instruction in existence, now or ever, and in spite of its many and serious drawbacks, promises to remain with us for a long time to come.

Advantages of the Lecture

The fact that the lecture has survived as long as it has is some indication that it is not totally without merit as a teaching tool. It has several advantages that render it useful in many circumstances. It is a very economical method, since it can be organized quickly by one skilled in its use, and can be presented to large numbers of listeners at once. It can be made to cover broad areas of subject matter, or can be restricted to a narrow field. It is flexible; it can be adapted to any audience in respect to time, informational level, or specific interest areas. It is readily transcribed or recorded, and can be re-used easily.

One of its greatest advantages is that it is an excellent vehicle for presenting human models to a group (Weaver, 1980). It is quite effective in creating in an audience a sense of relationship between the model and the subject the model is

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presenting. That is to say, the presentation of the subject matter by the personality has an affective impact on the audience in that it will make direct associations between the value of the information and the impressions it has of the speaker. Conversely, it also permits the speaker to modify the material to suit more closely the listeners' interests or needs as they may appear during the presentation. In a sense, the lecture has the ability to be modified "on its feet" as it unfolds and as the speaker perceives the sense of his or her audience making itself known.

Disadvantages of the Lecture

As with anything that has a use, the lecture has some disadvantages. It offers the speaker limited opportunity to gauge audience reaction, and is inflexible to individual differences within the group. The lecturer sets the pace, and without interrupting the presentation, the listener has no way of controlling it. In the case of those students referred to in this article's opening paragraph, many would have little desire to do so anyway, since it is easier to sleep through a lecture if no one disturbs the professor while he or she is delivering it. The anonymous wag is credited with having once said that a lecture is merely the notes of the professor getting into the notes of the students without ever going through the minds of either.

This brings us to a point where it might be appropriate to consider the nature of man in relation to this venerable instrument. What particular qualities (or lack thereof) in man's personality allow the lecture to be more or less effective as an instructional instrument? One study (Stanton, 1974) has tentatively identified the optimal recipient of the lecture as being one who is less conscientious, persistent, self-sufficient, and resourceful than counterparts who do better in self-directed learning. These recipients usually are also more practical, conventional, and careful than the self-directed.

The lecture severely limits the degree to which an audience can actively participate in the learning process. It places a heavy reliance on the memory of the listener and demands prolonged concentration. This could, perhaps, be one of the reasons why this venerable instrument has incurred much of the round damnation dragged down upon its head by those subjected to its tender mercies. Furthermore, it provides little in the way of developing higher-level intellectual skills and attitudes. That is, it does not force the listener to specifically analyze and evaluate its contents, or modify long-term behavior as a result. Listeners remain free to pay what attention they will to what part they care to. So it is impossible for the

lecture itself to overcome this inherent weakness. Individual speakers may be more or less successful in holding audience attention, but that is not a result of the lecture format. To be most effective, it requires good delivery skills on the part of the lecturer (again, a sometime professorial shortcoming to which many students will vociferously attest).

Criteria for Use

Any particular mode of instruction has its own special area of usefulness. When this boundary is overstepped, then the vehicle loses much of its impact. The lecture, by its claim to antiquity, would try to escape this basic truth, but it too must recognize the bounds of optimal use. There *are* legitimate restrictions on its use.

It needs to be remembered that when prescribing the lecture, the instruction to be conducted within it cannot be managed with any precision (Gagné and Briggs, 1979). In other words, it is difficult if not impossible to ensure that the teaching one is trying to carry out is effective in terms of listener reception and retention. Moreover, without the incorporation of practice into the lecture, it is not always certain that the listeners will retain enough of the instruction until a time when it can be practiced and tested.

There are times and places where the lecture will serve a useful purpose. Some of these circumstances are listed below, and while the authors feel that these are reasonably inclusive, they are aware of the possibility that others may exist.

• *When there are insufficient resources to use more effective or suitable formats.* Money is a powerful constraint in any program, and many highly effective forms of instruction are costly, both to acquire and operate. Lecture has a low acquisition and delivery cost in relation to other forms of instruction, and is, therefore, easily developed for instructional purposes without great expense.

• *When there is lack of qualified teachers for other instructional methods, such as tutoring.* One teacher can deliver a lecture to an almost unlimited number of students, while distance media such as radio and television extend this audience even beyond the lecture hall's capacity.

• *When there is insufficient instructional material for other forms.* Often, texts or other instructional implements are either non-existent or unavailable when instruction must take place. In these cases, lecture may be the only suitable instructional format available. The situation often occurs when a new piece of equipment is introduced to an organization and individualized instructional materials are not yet available. A demonstration by an expert may be the only way the equipment could be put into immediate use.

• *When large numbers of students must, or can be, instructed at the same time.* Where it is imperative that information be presented at one time and place, the lecture often proves suitable. However, if any other method can be economically employed, the lecture should not be used alone. While it would seem that we are merely restating here a reverse condition of that referred to in the comment on availability of qualified teachers for other forms, it is assumed that not all instruction is worthy of individualized instruction either because of its importance or level of difficulty.

• *When the group is homogeneous.* The lecture is most effective when delivered to groups who share certain characteristics, such as a common level of verbal and analytical skills, or when the group agrees on general terms used within the discipline in which the lecture is delivered.

• *When there is a need to arouse interest in a subject.* Often, when students are not familiar with a particular field or some specific aspect of one they do know, it is necessary to stimulate interest in it before any usable instruction can be conducted. It may also be necessary (or effective) to persuade the audience to think in terms of the desirability of knowing what is to be offered in the presentation. The lecture can fill this need by giving introductory information, and by framing the subject in a context with which students are already familiar, as in the Keller Plan (Keller, 1968). Another strong advantage of this method is that it can easily involve listeners in a subject through the personality of the speaker. In other words, the role of the speaker as a model with which the listeners can identify finds a powerful vehicle here (McLeish, 1968). By placing unfamiliar matter in a readily identifiable context, the lecturer again creates an atmosphere that will help to generate interest in the subject.

• *When information is easy to remember.* Since the lecture offers little opportunity for the listener to practice the information presented, for retention to take place the information must be of a kind that is easy to relate to previous knowledge, and must be readily integrated with it (Ausubel, 1968).

• *When information is urgent.* In situations where change must be made in a very short time and sufficient resources are not available for individualized instruction, then lecture probably will be the only viable method.

• *When information changes rapidly or frequently.* In situations where information rapidly becomes obsolete and must be constantly updated, the lecture is the cheapest, quickest method of

dissemination, and with proper media support, such as well-constructed handouts, it may be as effective as other, more complicated delivery systems.

• *When it is necessary to prepare instruction in a special way for a special audience.* If the group is too small or if the instruction is of low enough priority that individualized material would not be economical, then a lecture could be the most efficient method.

There are specific conditions under which the lecture *should not be used* as a method of instruction. The literature suggests several situations where it is unsuitable (Osterman and Coffee, 1980).

• *When subject matter is highly abstract or complex.* Abstraction and complexity are relative terms and are dependent upon the context in which they are used. However, at any level, excessive detail or variance from the mere concrete presentation of information will interfere with the intelligibility of the lecture (Dickenson and Verner, 1967).

• *When long-term retention is necessary.* When there is no provision made for practice in instruction, information can be remembered for only short periods of time, and then only in relatively small amounts.

• *When immediate evaluation of individual understanding is required.* With large, passive groups, ongoing testing for comprehension is difficult, if not impossible. In fact, to constantly interrupt a lecture to test each listener would change the very nature of the presentation.

• *When individual student record management is required.* Again, the lecture is intended to present information to large numbers of listeners at one time.

• *When active listener participation is required.* Once more, as in the situation above, the lecturer is precluded from providing individualized instruction except in some restricted incidents, as will be discussed below in the "Interactive Demonstration" variation of the lecture. However, in general, where active student participation is required, other methods of instruction will generally be more appropriate.

• *When listeners are below average in intelligence.* "The intelligibility of a lecture tends to increase as the educational level of the audience increases. In general, very little of a lecture can be recalled except in the case of listeners with above-average education and intelligence" (Dickenson and Verner, 1967).

• *When its use precludes practice through other means.* If information presented through the lecture is for future use, then it must somehow be remembered until it can be applied. Since practice is important for retention, the lecture should not be a substitute for practice. The lecture should be used only when the knowledge and skills taught by it can be practiced in some way shortly after its conclusion.

Until now, we have not given any definition to the word "lecture" and have more or less accepted by default whatever connotations general usage (as individually determined by each of us) has bestowed on it. Oddi (1983) shows it defined as a traditional approach by Godrov and Kazerani; as didactic by Bubenzer; as an expository, teacher-oriented presentation by Whitehead; and as the teacher-directed conventional approach by Spring. For the sake of argument, and to give a common point of departure to that argument, we have arbitrarily decided to give the word a most restrictive definition. For the balance of this discussion, let us assume the lecture to be a formal monologue delivered to a group.

The General Model

The lecture is divided into three parts, the beginning, middle, and end. These are sometimes called the introduction, body (or presentation), and summary (Gage and Berliner, 1975).

Introduction

The simplest form of lecture is where we stand before an audience and say what we have to say, without having any control over the audience's receptivity, except through personal speaking ability. In turn, the audience has no control over the speaker short of what are generally grouped between rude and uncivilized reactions ranging from mass walk-outs to peculiar verbiage, to the launching of superannuated missiles. Fortunately, it is uncommon these days to have to place monitors at the doors of the lecture hall to check for the presence of over-ripe farm produce. In this style of lecture, we will first gain the attention of the audience through any one of an infinite number of strategies. A simple clearing of the throat may at times be sufficient, while at others, mounted police with rubber truncheons may be only moderately effective. Usually something in between, such as a mere "Good evening ladies and gentlemen," is enough.

Once attention has been gained through some method (usually somewhere between the two extremes above), we will present some opening remarks in reference to the topic at hand. We might begin with a few personal anecdotes, something in a light and humorous vein. We could then describe the objectives of the lecture, and how they relate to the listeners' situation. We would

then advise the listeners of what is expected of them as a result of the lecture. If tests are to be given, or if some particular form of practice is to be conducted, these should be explained at this point (Gage and Berliner, 1975). These remarks could further serve to gain and focus the audience's attention while presenting the general ideas or facts to be discussed at a very broad level.

We would then propose some general questions for the audience to consider during the talk. This would serve two purposes: first, to heighten the listeners' interest by involving them in the presentation, and second, to give them a more specific indication of the nature and content of the lecture. These questions will also serve a stylistic purpose in subsequently relating the beginning of the speech to the middle and the end. It is always more comfortable for both the speaker and the audience when the lecture has those three parts in recognizable locations and balanced proportions.

Presentation

We now move to the body of the talk, where we will spell out in detail what is to be presented. It is important here that we have a clear idea of who the audience is, as our appeal will be determined by how well we can relate to the group and address it at its own level (McMann, 1979).

Here, each fact or idea will be presented in a general or simple form and further refined by introducing more specific or complex elements in the order of their increasing specificity or complexity (Reigeluth, 1979).

It is sometimes helpful in keeping the listeners' attention if incongruous situations or statements are introduced at times. These will help to stimulate thought and will also help focus attention on important issues during the lecture. These incongruities could be further employed by suggesting possible resolutions mixed with non-resolutions to help the listeners clarify the issues themselves. A great number of other strategies can be employed here, and their variety is limited only by the imagination of the lecturer. Such strategies as deliberate misstatements, and graphic examples of problems may be effectively employed. One interesting attention-keeping device is the use of incomplete overhead transparencies upon which the lecturer can write or draw to finish the message.

Summary

The final step in the lecture is the summary. At this point, all the "loose ends" are gathered up, and the objectives are restated. We then can recapitulate the major points of the talk and review the general arguments offered in their proof. Any incongruities that have been presented should

either be resolved now or referenced to a subsequent lecture, and unresolved questions should be clarified. We can have hand-outs (fact sheets, user-guides, or the like) distributed, and can suggest memory aids such as acronyms, rhymes, chunking helps, or other strategies to aid in remembering the major points.

Each lecture, like any other lesson form, should contain only one major instructional issue (Reigeluth, 1979). If there are others to be taught in the same way, they should be placed in subsequent lectures. Each following lecture would keep the same basic format with only slight revisions to relieve monotony. The introduction of the following lectures would include a brief summary of the preceding lecture as a synthesis for its relationship to the whole.

Variations on the General Model

The Interactive Lecture

The interactive lecture is much the same as the general model except that it accommodates some overt activity on the part of the listener during the lecture process. This usually takes the form of speaker-generated questions directed at the listeners, and listener-generated questions at the conclusion. Using the format of the general model, we can modify it to become an interactive lecture by merely adding the first of these activities to the lecturer's part and introducing the second activity to the listeners'.

Introduction. In the introduction of the interactive lecture, we may involve the listeners by asking some general and fairly easy-to-answer questions to the group as a whole and eliciting some responses. We could ask for volunteers to respond or could merely ask for anonymous responses from the group. It would be appropriate to have some form of reward for responses even if they were incorrect. The reward could vary from positive feedback such as "very good" to one that would correct the wrong answer in such a way as to incorporate in it the elements of the answer that were correct. By presenting a non-threatening atmosphere at this point, we encourage participation throughout the lecture (Nolan, 1974).

Presentation. In the body of the lecture, depending on the nature of the presentation, we will elicit more specific responses either from the group as a whole or from individuals, preferably volunteers.

We would then provide feedback to the responses that will clarify them if they are inaccurate or if the listeners are not clear about the subject (Thompson, 1974). Wrong responses should be corrected, and incomplete ones should be filled in. In all cases, we would offer positive reinforcement.

During the lecture, we may test for student attentiveness by making deliberate errors or by presenting some element that should elicit a response from the listeners. One would be well advised here to assure that those elements invoke only desired responses. Audiences can sometimes be a bit unpredictable. If a suitable response is not received, we may assume that we are not getting the point across and can then take appropriate action. Be sure you know where the nearest exit is located!

Summary. The summation of an interactive lecture can be conducted in several ways. Either we can recapitulate the presentation, or we can call upon the listeners to do so by asking a series of summative questions or by having the listeners offer summative comments. The summation of the lecture, whether it is interactive or non-interactive, can also form a synthesizing bridge between previous and future lectures by providing links with what has been said and what will be said.

The Demonstrational Lecture

The non-interactive demonstrational lecture differs slightly from the non-interactive lecture (general model). It uses the same format but operates within it with some minor variations. However, it is a separate model in that its intention is usually to present some type of procedural instruction rather than simple facts or information.

Introduction. Along with identifying the purpose of the demonstration, we familiarize the listeners with the procedure to be used. We point out the main features of the demonstration; describe the steps of the procedure; identify the material on which the operation is to take place; point out its salient features with respect to the operation; and if the procedure is fairly short and simple, give a complete demonstration. In place of the latter, we may present some alternate demonstration of the procedure. A film taking the viewers through the steps may be shown, exploded diagrams of the material in question may be used, or other appropriate forms may be employed.

Demonstration. The demonstration is the body of this kind of lecture. In it we perform the operation in its component steps and describe each as we progress. This presentation may be given in different ways depending on the nature of the task. In some cases, the demonstration will follow the procedure used in executing the task being taught. In other cases, it may follow a pattern of presenting a series of basic steps to accomplish a simple version of the task and then going back and adding more complicated procedures to accomplish more complex versions of the task. Where the demon-stration is complicated, where it has more than a few steps, it may be taught in sections of steps. This process would be repeated until all steps had been taught. At the end of each cycle, we would review and summarize the partial procedure, and at the same time we would integrate it with those parts that had been taught before.

Summary. To summarize the demonstration, we would review each major step and its component substeps. We would clarify confusing points in the listeners' minds and redescribe any parts that were still unclear.

The Interactive Demonstration

The interactive demonstration has all the characteristics of both the non-interactive demonstration and the interactive lecture. The listeners actively participate in the procedure. Where the task is of a fairly simple nature, and sufficient material is available, each student could perform the exercise along with us.

Conclusion

The lecture, in spite of its many shortcomings, is still an effective method of instruction when it is used for the proper purpose and with the right audience. However, whether because of its familiar form, ease of construction, or our unwillingness to use more effective teaching instruments, the lecture is all too often abused. It can be as effective as any other method of instruction, but only when it is used in the right place, for the right reason, and with the right audience (Voth, 1975). It is a means to an end, and should not be used merely for its own sake. When other means are more effective, the lecture should be abandoned in their favor (Thompson, 1974).

Epilogue

To anyone who has ever spent time in an educational setting either as a student or as an instructor, the foregoing description of a lecture may sound rather sterile and even artificial. One could wonder where such instruction actually takes place in the real world, or if in fact it does. It probably takes place far more often than one would imagine. The elements of the lecture as we have presented it here are imbedded in nearly every form of instruction at one point or another; and to the extent that these elements are effectively and sensibly managed, the instruction will be effective. It is the hope of the authors that by describing those elements of lecture in an isolated setting, the reader will be able to use them more effectively in educational applications.

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How We Can Teach Computer Literacy at the University

Marjorie F. Fruin and Amar S. Bakshi

Within college and university settings, educators are asking questions about how best to deal with growing computer usage. Students are faced with increasing pressures to be "computer literate" prior to entering the job market. They often have not had exposure to computers at the elementary or secondary levels. Further, they may not have been required to take computer programming as part of their college coursework.

Various authors have attempted to define what students need in order to be computer literate and have suggested how these needs might be addressed. For some time, at least among computer novices, there was little or no distinction made between the terms "knowing about" and "learning with" computers. Gradually, however, the terms have come to be more or less synonymous with computer literacy and computer-assisted instruction, respectively.

Recently, Anderson and Klassen (1981) proposed a comprehensive framework defining skills and abilities, and also attitudes, which would constitute computer literacy. This framework can be used by educators in designing instructional materials to achieve computer literacy.

Another issue is *where* to teach computer literacy. One school of thought supports the notion that a programming course should be a requirement in any curriculum. The unspoken assumption here equates computer programming with computer literacy. Another group argues that computer applications should be integrated into content areas; that computer capabilities rather than computer language facility is what must be learned. Others push for both approaches, evidently believing that more is better.

Molnar (1978) has addressed this question: "We

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