developed and exploited. Color appears to be desirable even if it is not essential, and it should be provided if practical in a field-sequential scheme.

It should be possible to produce films locally at low cost on entire segments of instruction. This would permit revision by instructors as content changes. Films would be used for direct instruction, and the instructor would devote his time to preparing new material and counseling students.

What is the desired goal of an ideal instructional film system? There should be a projector in each classroom and films should be as numerous as books. The projector should be capable of operation by students and teachers without training and should have no maintenance problems. Certain films should be made by national experts while others should be made economically by local teachers for use in their schools. When these ideals are obtained, instructional films will assume a more dominant position in our educational structure.

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Discussion

Chauncey L. Greene: (*RKO, Minneapolis*): I have not been in the visual education field recently but when I was it seemed that the degradation of quality of the screen image materially shortened the length of time over which the students would maintain mental acuteness. In reference to your statement of the comparatively small importance of image quality, what was the length of the teaching period at the time that the data was being gathered?

Dr. Twyford: I believe this information comes from our experience with instructional television using the very inexpensive vidicon cameras. A great deal must depend upon the detail that must be present in the pictorial image. If fine printing or much detail in equipment is to be shown, then certainly you would want very good detail in the picture; however, television, with its lack of quality, particularly with some of the vidicon cameras, has proved quite successful when used over periods of one hour — which is usually sufficient for most educational purposes.

Alan Kellock (*McGraw-Hill Text-Film Dept.*): You noted the growing importance of the sound filmstrip as a means of instruction but I believe you did not mention the possibility of individuals using filmstrips through the use of the filmstrip viewers, either silent or sound. Has your research developed any information along this line?

Mr. Twyford: There is not much information in that area. My own reaction to your statement is that the cost of equipment must be justified in the educational scheme of things. From this viewpoint it is important that the film itself do an entire teaching job. I believe that individual viewers have their place more as accessary than as essential instructional devices.

New Perspectives for the Use of Film in Teaching

By SOL ROSHAL

To meet educational requirements, film production must branch out in two main directions away from present practice. Short, specific films which can be used more flexibly by the teacher and student are needed as well as those which can be used to carry a complete lesson; and the use of such films requires new distribution procedures and new projection equipment.

SINCE THE earliest days of motion-picture production, possible uses of film for educational purposes have been considered and evaluated. Even Thomas Edison made large claims and ambitious predictions for the use of the motion picture as an instructional medium. But in spite of this long history of trial, experiment and discussion, the instructional possibilities of film have hardly been exploited. There is need for, and there is justification for, wider and more intensive use of film.

Merely broadening the area of application provides, of course, insufficient enhancement of any given scientific or technological field, and thus for fuller realization of the film in education, there must be new perspectives and new developments both in the film itself and in the way it is used. This paper describes new directions which, it is believed, hold great promise: two new genre of films, true film libraries and new projection equipment.

There are certain psychological and sociological reasons for the historical neglect of these "perspectives," but these would not be good arguments for continued neglect. The requirements of teaching systems logically demand further and accelerated development in these directions.

Film for Exact Needs

The first of the two genre of films is a class of short specific films designed to meet definite or limited instructional needs or objectives. If the need is to teach the tightening of a nut with a particular wrench, the requirement is for a film which teaches or demonstrates the tightening of a nut with that wrench, not a film on the care and treatment of hand tools, nor one on the development of tools, nor even one simply titled *Wrenches*.

A student wants to know how a lumberman cuts down a tree. His teacher can find films which tell about our wonderful forests, the lumber industry, the economic and social aspects of trees, and the marketing and uses of wood. One or more of these films will show trees being cut down, but a piece of film which just shows how a lumberman fells a tree is not available to the teacher.

Why should the teacher want this little piece of film? Why not make the interest in felling a tree the occasion, the motivation, for a broader learning experience? The answer depends upon what the teaching objectives are. In engineering terms: "What are the specs?"

An engineering model should serve well to illustrate this point. The film which is characteristically available, at present, from the educational film distributor is an off-the-shelf black-box. It happens that effective systems can be and are built by the simple assembly of off-the shelf components. More often, the available components must be adapted to the system requirements by such devices as matching amplifiers and transducers. In education, courses can be and are made up of available materials, but usually the instructor supplies the mating elements to tie and integrate the film he uses into his lesson plan.

Further, a design engineer would be very unhappy if he could not buy smaller pieces than black-boxes — he wants to buy tubes, resistors and transformers. He would assemble some pretty cumbersome systems if he were limited to using only available black-boxes. The teacher, too, very often finds himself in the position of needing a small element — a little piece of film to illustrate a single idea or explain a single concept.

Another kind of illustration of the need for these short films may come from looking at an encyclopedia. An encyclopedia

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has both short and long articles. Some articles are two or three pages long while others are only two or three, or even one paragraph long. The filmed counterpart would have films 10 or 20 minutes long and others 2 or 3 minutes long.

The idea of a filmed encyclopedia is, incidentally, intrinsically interesting and would constitute a useful project. Large parts of the encyclopedia, mainly the longer articles, could be assembled from existing releases. The short articles would have to be produced, for they have not been made.

Suggestions for Short Films

There may be great difficulty in convincing educational film producers to make these short films because they will not see these bits as marketable units. Indeed, these short films would have an impossible price if the distribution costs for a one-minute film ran to the present distribution costs for a one-reel film. Possibly a solution may be found by borrowing again from printed matter practice. Several short films might be packaged together as volumes and the volume would be the marketing unit. The encyclopedia mentioned above may be a solution or, at least, provide a rationale for the definition of "volumes." Another possibility may lie in the package of text-correlated films — that is, a group of films designed to go with a particular textbook.

The Complete Course on Film

The other class of films takes off mainly in the opposite direction — longer films than are typically available. There are few films or sets of films which are designed to carry a complete course of study or even a complete lesson unit in and by themselves. When this issue is raised, two questions come immediately: "Do we need such films?" and "Can films be built which will do a complete teaching job without a teacher?"

While there is great controversy as to whether there is or is not a shortage of teachers, many educators contend that not only is there a shortage but that there will be an increasing one. Others believe there would not be a shortage if available teachers were used efficiently. Without entering the controversy, suffice it to say that there are courses, especially science courses, which are missing from the curricula of many schools simply because teachers are not available to teach these courses. All seem to agree that these courses should be taught, and so some way must be found to do it. One route may be through film.

The second question "Can films be built which will do a complete teaching job without a teacher?" is hard to answer in that form. The word "complete" makes it tricky. This is like asking, "Can you build a perfect amplifier?" The answer to the question in that form is "No." There will always be the possibility of building a better one. But given a set of specifications, the question takes on a new character. You might or might not be able, today, to build an amplifier which will meet a particular set of specifications. The same applies to the instructional film. If instead of complete, you specify a set of performance characteristics, you may or may not be able to fulfill the requirements at any particular state-of-the-art. There is no doubt that you can build films that will do various and effective teaching jobs.

The notion of the self-sufficient film in the context of industry has some very interesting implications. Though not necessarily for the same reasons as our schools, industry, too, has teacher shortages. The film offers industry not only a tool for increasing the efficiency of training but, also, a means for reducing the training requirement.

One approach to job simplification is through the development of job-aids. Here, too, the film can be useful. Picture some sequence of job operations and imagine a step-by-step film demonstration of the work procedures. This is the job-aid. Good job-aids may guide an unskilled or a semiskilled worker through his job, thus reducing or obviating the need for prior training in that job.

Film Libraries

The typical film library now in operation borrows little more than the name and some cataloging and recording procedures from the traditional library. What is needed is a true library — one really used by students and not just a warehouse for film. A film library should make films available for student use just as the traditional book library makes books available to the student as active learning tools.

Consider the use of a printed-matter library in the pattern of the typical school audio-visual library. This library is sacrosanct. Students may not enter. If they do enter, they certainly don't browse. Students aren't permitted to read books. Sometimes a student committee may read a book — under proper supervision. But a student does not get an assignment to read on his own and he is never sent to do research in the library. In fact, if there is some printed matter deemed important to the students, the teacher, or an "expert reader" will bring it to class and read it to them.

This is a fairly ludicrous picture, but it is true when "film" is substituted for "book" and, ludicrous though it is, it is a true description of today's audio-visual libraries. The educational requirement, however, is for broadening, not limiting, the avenues of exploration open to the student. The student must have films as well as books, pamphlets and magazines made available to him. That is, give the student the tools to do his job.

Film librarians may reasonably argue the dangers of admitting students who would, the librarians say, soon tear up all the film and clobber all the projectors. This is a problem of instrumentation. Obviously, some new equipment is required. It is neither a depreciation of the problem nor an idle joke to say "That's an engineering problem." Why not build projectors students cannot put out of order and make arrangements to prevent the destruction of film?

New Projectors

The specifications of the 16mm projector found in the average classroom were not generated by teaching or classroom needs. Rather, the objective has been to approach theatrical requirements and theatrical standards as closely as possible. There are available today 16mm projectors which can deliver theatrical quality, if the film has the quality. In general, approaching the 35mm standard means departing further from the classroom requirement.

A few years back, the writer directed an Air Force development project for the design of an instrument which would be suited to the use of the film in teaching.* We had in mind the use of film in the classroom, in self-teaching, in a true film library, and later, with the job-aid.

None of these is a theater situation — and the first requirement that this suggests is daylight viewing. The classroom has been darkened about as many years as film has been used in the classroom, but this is a poor procedure. If students are to do more than watch the film, that is, if they participate actively in the learning process, including old-fashioned note-taking, there should be some light on the subject. If the teacher is really to integrate the film into his teaching practice — and he should be able to use film as flexibly as he uses the blackboard — he cannot set up a theater every time he switches from lecture or discussion to film. Certainly when the filmed job-aid is considered, the idea of darkening the room must be abandoned.

The second requirement is ease of use. The time required for accomplishing the preliminaries to film viewing is wasted for teacher and students. Further, there should be no general requirement for all teachers to become expert projectionists. It is easy to find teachers who do not use film solely because they cannot use, or are uncomfortable with, the projector. For self-teaching, it is unreasonable to require projection as a student skill like reading and writing.

An allied requirement is that the handling of film should be strictly and rigorously limited to people who do have the skill. None but technicians should need to, or be allowed to, handle the film. In

* Of the Air Force researchers who contributed to the development of the viewer and filmed job-aids, mention should be made of at least A. A. Lumsdaine, A. J. Hoehn, and F. F. Kopstein.

the job-aid application, it is easy to see that a mechanic should not be able to get begrimed hands near the film.

And the equipment and system should allow incisive study of the film. At a minimum, this means flexibility in selection of portions for intense viewing and easy immediate reshowing. For this purpose, Polan Industries, of Huntington, W. Va., designed, for the Air Force, a self-contained suitcase sound viewer with integral screen and sealed magazine which is activated upon insertion of the magazine.

Other approaches are certainly possible and should be developed and evaluated.

Each of these perspectives should lead to advancement of the film in teaching. But equally important is the approach which led to the definition of the particular items. It can be described as the application of system engineering procedures to the problems of education. There never has been any formula for creativity, but solutions pertain to problems, and problems are set by functional requirements.

Discussion

Hartwell T. Sweeney (Eastman Kodak Co.): Do you consider it vital that educational films be run only at certain speeds, assuming that sound limitation is not necessary?

Dr. Roshal: No, nor do I think it necessary to insist that we have 24 frames for sound. But if we deviate from the accepted standard — in the industry — then more and more re-design becomes necessary. There are some who believe there should be complete re-design from the camera to the viewer. Perhaps we shall have some papers in the near future on this subject. It seems certain that if you have more than one speed, there should be no adjustment required by the teacher or the film viewer. The adjustment in motor speed should be automatic.

Responsibilities of Classroom Film Producers

By ALAN KELLOCK

In today's competitive world, with nations going all-out to strengthen their educational systems, the responsibilities of the classroom film producer take on a new and vital importance. He must choose subjects carefully to fit the curriculum, use competent subject-matter advisers, and create scripts that will provide genuine learning experiences. He must be sure of technical production quality, and if desirable and practical, he should pretest his product before final release.

EACH YEAR the major classroom film producers together release about 400 motion pictures. Approximately another 800 films released each year by industry, government and other organizations find some use in the classroom. The latest issue of Wilson's catalog of educational films lists over 17,000 titles, of which 6000 have been released in the last five years. This vast outpouring of films places great responsibilities upon producers to make sure that the value of the medium for education is not dissipated through sheer volume of product, and to maintain standards of quality that will ensure continuing growth of the audio-visual education industry.

Although this responsibility is, or should be, shared by all producers of all films that find their way into the classroom, it naturally falls most heavily on those relatively few producers who are in the business of making and merchandising films primarily for classroom use. Since we are interested here in only that type of film, it may be worth explaining in more detail what is generally meant by the term "classroom film."

What Is a Classroom Film?

The classroom film, as referred to in this discussion, has three distinct characteristics:

(1) The film is made for a specific educational audience, i.e., a class of students within a relatively small range of courses and grade levels.

(2) The subject matter of the film is tied directly into the curriculum and is therefore suitable for study by the class group.

(3) The film can be integrated in its use with the textbook and other related instructional materials.

Many films loosely referred to as "educational" are not true classroom films because they do not have all of the three characteristics just mentioned. Some commercially sponsored films which explain and demonstrate products or processes may have some educational value for certain special learning situations, but comparatively few such films are widely accepted for standard instructional situations in schools and colleges throughout the country. That is why a sponsored or so-called advertising film, even though offered on a free loan basis, may not be used in classrooms as extensively as its sponsors originally hoped or expected. It also explains why films originally planned for television, even though full of carefully documented information and made with excellent talent, may meet with but limited use when released later for educational distribution.

On the other hand, it is not correct to think of all classroom films as being fixed in format, or as lacking in variety as a set of billiard balls. As a matter of fact, there are at least four broad types of films that can be classified as classroom films within the scope of the characteristics outlined above. And while I personally dislike the formality of classification tables, and endorse the warning of Professor Edgar Dale, a leader in our visual education field, who once said: "Beware of hardening of the categories," nevertheless it would be helpful here to delineate the principal types of classroom films:

(1) *Informational.* The basic purpose is to convey factual knowledge, or to develop an understanding of one or more ideas, events, principles, processes or relationships.

(2) *How-To.* The basic purpose is to demonstrate and teach a skill in some physical activity such as in vocational training, home and family living, sports, the arts or military training.

(3) *Open-End.* The basic purpose is to stimulate constructive thinking and group discussion about some idea, concept or phenomenon on which the film invites the audience to supply some decision or conclusion not presented within the film itself.

Some classroom films are so constructed that they combine elements of two or all three of these types, but most of them fall principally in just one of those classifications. To these we must add a fourth type which we might label the "extended teaching film." This type, quite recent in development, involves putting an entire course, or a major part of it, on film and having the students spend a major part of their scheduled classroom time each week looking at sequential units of the film series. In some places where classroom films of this type are used, they are projected

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