

Projectors

Projectors, as an effective projective equipment, occupy a prominent place in the instructions of various subjects of the school curriculum. In our classrooms, we generally make use of the following three types of projectors:

1. Slides cum filmstrip projector
2. Overhead projector
3. Opaque projector

Let us try to discuss these three types of projectors with respect to their construction, working and use.

Slide cum Filmstrips Projector

As the name suggests, this type of projectors are helpful in projecting slides as well as filmstrips on the screen and thus making it possible to view, in an enlarged form, the graphics like pictures, charts, diagrams, photographs, maps, cartoons, posters, graphs and timelines related to the subject. Generally, for the projection of this type of projectors, we make use of the 2" × 2" slides and 35 mm filmstrips. The construction and mechanism of this type of projectors have been diagrammatically presented in Figure 3.2.

The basic design of a slide-cum-filmstrip projector is same as that of lantern slide projector. The variation lies in:

- the mechanism for channelising and moving the filmstrip through the projector,
- nearness of projection lens to the aperture in comparison to that of the lantern slide projector, and
- provision of a cooling fan for protecting the filmstrip or slides from over heating.

For the use of this type of projectors, the teacher in charge should try to gain competency in the task of handling the switches meant for the operation of various functions of the equipment along with the certain needed precautions. After that he can insert the desired

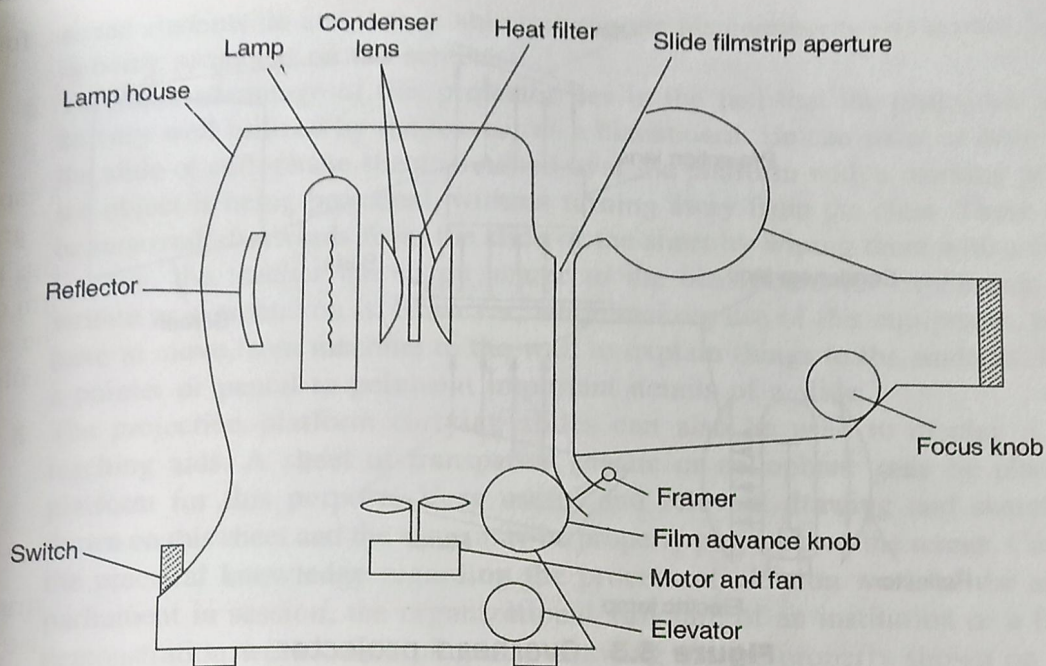


Figure 3.2 A slide cum filmstrip projector.

filmstrips or slides one by one at the proper time of their instructional use and keep them on the screen as long as it is necessary. Such projection of the filmstrips or slides on the screen, then, should be accompanied by the relevant verbal commentary for the needed exposition, explanation and illustration of the subject matter. A teacher himself can make the commentary or he can take the help of a student for this purpose. For better results, one can take the help of a tape recorder by taking precaution in synthesizing the recorded commentary with the things projected on the screen.

Overhead Projector

The overhead projector, although having similar optical elements, represents a lot of improvement over magic lantern, slide, and film projectors. The uniqueness may be summarized as follows:

1. It contains an area of vertical projection besides the straight horizontal path of light available with the usual projectors. The path of the light rays is again changed to a horizontal one by a mirror placed at 45° angle and continues over the shoulder of the teacher to the screen as may be evident from the diagram shown in Figure 3.3.
2. It contains a large aperture of the size 25×25 cm or 20×20 cm for placing the slides and other visual materials.
3. It provides for the focusing of the image on the screen by vertical movements of the projection head (containing the objective lens and mirror).
4. There is a provision of a constant flow of air past the lamp by a cooling fan in the base of the projector.

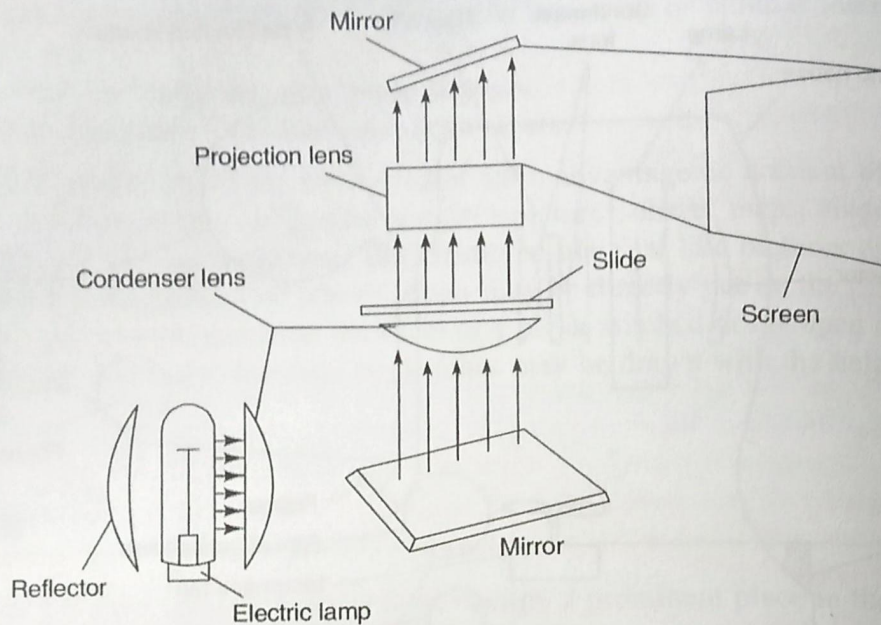


Figure 3.3 Overhead projector.

Advantages of overhead projector

This equipment as compared to epidiastroscope and slide-cum-film projector proves to be more valuable in the task of teaching and learning of all the subjects of the school curriculum, as may be revealed through the following discussion:

1. Since the image in this projector is projected over the shoulder of the teacher, he faces the class in usual way at all the times. With the class in full view, it is possible for him to observe the reactions of the students, adjust his responses and actions accordingly, and exercise the desirable control over the teaching-learning situations.
2. The optical system of this type of projector permits placing the projector close to the screen and blackboard. Therefore, the teacher can place it even on his table lying in front of the blackboard. He can teach in a usual manner by facing his class and, at the same time, he is capable of operating the machine. There is no need of separate projector operator or the accompanying instructor for the teacher to assist him.
3. Since a high power electric bulb (750 watt or 1000 watt) is used in the projection lamp and not much light is wasted in the projection operation, there is no need of darkening the room for the appropriate visibility of the image on the screen. Consequently, the problems regarding the arrangement for proper ventilation and cooling of the rooms do not arise.
4. The aperture of this projector is comparatively large. Consequently, it may allow the use of large slides of the size 25×25 cm or 20×20 cm. The large size of the slides may further facilitate the preparation of art work for slides.
5. Since the slides in this projector are placed on top of the glass aperture, there is no difficulty in changing the slides. Moreover, the teacher may also see the slides exactly

- as the students do and thus is able to integrate his comments and teaching with what is being projected on the screen.
6. The main advantage of this projector lies in the fact that the projection screen can be very well utilized by the teacher as a blackboard. He can write or draw at will on the slide or cellophane sheet stretched over the platform with a marking pencil while the object is being projected, without turning away from the class. These marks can be removed afterwards from the slide or the sheet by wiping them with a clean cloth.
 7. Usually, the teacher has to go nearer to the blackboard for explaining the things written or sketched on it. However, while making use of this equipment, he does not have to move from machine to the wall to explain things to the students. He can use a pointer or pencil to point out important details of a slide.
 8. The projection platform carrying slides can also be used to display a variety of teaching aids. A sheet of transparent plastic or cellophane may be placed on this platform for this purpose. Very useful and relevant drawing and sketches can be drawn on this sheet and the same may be properly projected on the screen. Consequently, the practical knowledge regarding the process of election work of the assembly or parliament in session, the organizational structure of an institution or a factory, and demonstration work concerning map drawing can be properly shown on the screen. Not only the graphics, but also the liquid material can be made visible on the screen by placing a transparent disc containing the liquid material on the projection platform.
 9. The operational task of this projector also does not involve any difficulty. It simply requires turning of the power switch, placing the slide on the projection platform and focusing the image on the screen.

Opaque Projector

The slide-cum-film projector and overhead projector discussed so far can only be used to project the transparent material. The opaque material, like picture, diagram and specimen can not be projected by these projectors. The third type of projectors, namely opaque projector do away with this difficulty. It can be utilized to project and display all types of objects, whether transparent or opaque, on the screen and hence, it proves to be more useful and effective in comparison to other types of projectors.

Design and working of an opaque projector

In opaque projector the principle of reflected light is used for the projection rather than the direct light transmission, as shown in the diagram in Figure 3.4.

The projection area in the opaque projector lies at the base of the projector. The objects that are to be projected on the screen are positioned on the projection platform. The projection bulb and the reflector are located in front of the projection platform at an angle of 30° .

The entire platform is surrounded by a series of mirrors that reflect light from the projection bulb on to the materials being projected. This reflected light arrangement projects the material from the direct intense light of the high-powered projection bulb. As the light after being reflected from the projective material moves upward, it is obstructed by large

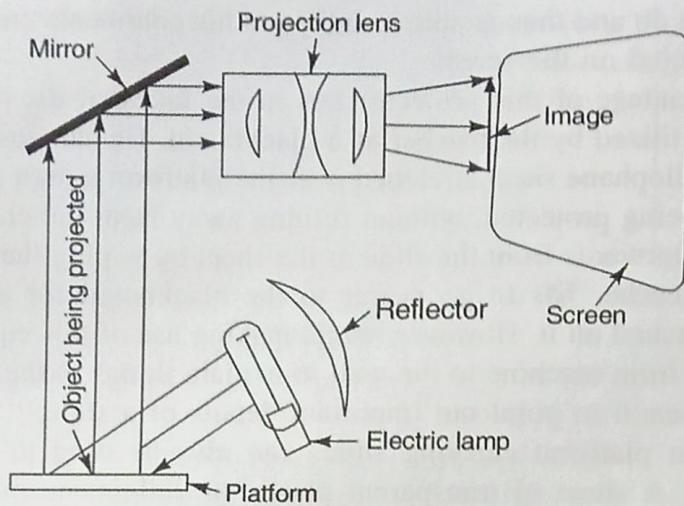


Figure 3.4 Path of light in an opaque projector.

mirror placed at an angle of 45° . This mirror reflects the image of the projective material on the screen through a large objective lens.

Educational advantages of opaque projector

An opaque projector can be very valuable in the task of teaching and learning of the various subjects of the school curriculum in the following manner:

1. Any material, whether transparent or non-transparent, related to instruction can be properly projected on the screen for viewing by the entire class with the help of this projector.
2. In this projector it is not essential to prepare slides of the graphic material for its visual display on the screen. Material like photographs, pictures, graphs, diagrams, and handwritten or printed material can be projected on the screen in its original form without converting it first to slides.
3. The most striking use of the opaque projector lies in the fact that it needs almost no arrangement or preparation with regard to mounting for the display of graphic material on the screen. The pictures, illustrations, maps and diagrams given in the books, magazines and other sources can be properly projected on the screen without getting them removed from their original sources. If what is written, sketched or drawn on a piece of paper or a page of a textbook or other reference source should needs to be observed by the entire class, one has to simply place this piece of paper or page of the book (without getting it removed) on the projection platform of the equipment for getting a properly enlarged image of the screen.
4. All types of three-dimensional aid material such as actual objects, specimen, models and mock-ups can be projected on the screen by placing them on the platform of this equipment. Their enlarged images on the screen are clearly visible to the entire class for the study of minute details and other characteristics. Not only that, but the living material can also be exhibited through such projection. Therefore, the use of an

- opaque projector may prove quite helpful in teaching and learning of the topics where one has to study the life and effects of the living specimen, i.e. the phenomena of pollution, spread of viral and infectious diseases, impurities in the water, etc.
5. The projection carried out through this projector can prove quite helpful in the study of various topics related to the subject areas of history, geography and other social as well as environmental and natural sciences. The display and use of the objects like postage stamps, rare coins, printed or handwritten valuable documents, records and manuscripts, and specimen of many related things for the relevant instructional activities becomes quite possible with the help of the opaque projector.
 6. A unique advantage of the opaque projector lies in the fact that it can be utilized with care for enlarging and transferring graphics and other illustrative material to a chalkboard or to the large sheet of chart paper placed on the screen for tracing. Consequently, a small picture, diagram or map given in the textbook or magazine can be properly projected on a chalkboard in the desired size and quickly traced for the current instructional use. The task may prove quite beneficial for the teachers and students which can help them in the preparation of valuable graphic aids and illustration, simply by tracing the projected figures and outlines on the sheets of the paper stretched on the chalkboard or screen.

Thus, the use of the opaque projector may prove quite helpful for the teachers and students on account of the simplicity and unique characteristics of the projection task carried out through this projector. An unlimited supply of transparent and non-transparent materials easily available for projection, and the scope of its easy projection in a quite enlarged form on the screen make this equipment a valuable aid in the teaching and learning of almost all the subjects of the school curriculum. The main drawback related to the need of having complete darkness may be handled through suitable remedial measures. However, the recent development in the area of opaque projection have introduced such equipment which can operate in a semi darkened and lighted room and, therefore, by using these new equipment this drawback can also be removed.

Radio

Radio, as an effective audio aid device, is capable of providing valuable assistance to the teacher in the classroom by presenting worthwhile information and learning experience to a large number of students. Commenting over its potentiality as an instructional aid, R.G. Raymonds (Quoted by C.L. Bhalla, 1953: 91) writes:

Radio is the most significant medium for education. As a supplement to classroom teaching its possibilities are almost unlimited. Its teaching possibilities are not confined to the five or six hours of the school day. It is available from early morning till long after midnight. By utilizing the rich educational and cultural offerings of the radio, children and adults in communities, however remote, have access to the best of the world's stores of knowledge and art. Some day its use as an educational instrument will be as common place as textbooks and blackboards.

These broadcasts are of two types:

1. General broadcast providing general information about the events and happenings, assimilating knowledge about the worlds, culture and life.
2. Educational broadcast specifically prepared and broadcast for serving the cause of education and classroom in the form of radio lesson, lectures, etc.

Advantages

The educational advantages of radio broadcasting may be summarized as follows:

1. Radio broadcasting makes it possible to listen to the lectures, talks, discussions and seminar proceedings of educational interest in which renowned authors, educationalist, leading scholars and other important personalities may participate. Such contact is bound to provide immense educational and psychological value to the students.
2. Radio broadcasting, through its planned and sequenced classroom lessons on various topics related to school subjects, may provide much assistance to the classroom teacher in realizing the instructional objectives.
3. Radio broadcasting has a potentially of becoming a potent source of education as these are capable of integrating education with the real life experience on one hand and healthy entertainment and source of pleasure on the other. The students can be easily motivated to listen to the radio talks and thus derive the desired educational benefits.
4. As a mass media, radio broadcasting proves a highly economical source of educational instructions. Its advantage may reach uniformly to millions of its listeners by breaking distance and time barriers. The cost per capita of listeners in educational broadcasting service is almost negligible.
5. Radio broadcasting is capable of solving various problems in the field of education arising out of the shortage of man-material resources. There is a shortage of good textbooks, well-planned instructional programmes, suitable instructional devices and aids and competent teachers. The learner population is increasing day by day. The courses of instructions are widening. It is not possible to provide the benefits of education to such a large number of learners with the desired efficiency without the aid of an effective medium like radio broadcasting.

How to Utilize Radio Broadcasting in the Classroom

The educational broadcasting services offered by the AIR and other radio channels may render valuable assistance in the classroom instructional programmes. For the desired outcomes, it needs a careful effort on the part of teachers. Let us summarize what needs to be done by the teachers on this aspect.

1. The teacher must acquaint himself with the schedules and programmes of these broadcasts through the relevant available literature.

2. He must carefully think and plan the integration of the scheduled broadcasting programme with his classroom teaching.
3. The teacher must try to prepare his students as adequately and possible educationally as well as psychologically to properly get the knowledge and experiences, imparted through a radio broadcast.
4. He should seek proper control of the environmental situations, physical conditions and learning environment for the proper utilization of radio broadcasting. He should be sure that all the students hear a clear signal. The set should be properly located. The room conditions should be favourable with a minimum of distraction and outside disturbances.
5. The radio broadcasting should have an adequate follow-up programme. There should be a lively discussion over the learning objectives achieved through the broadcasting. The learning gaps and difficulties in understanding the radio presentation should come into limelight. The actions and reactions occurred in the minds of the students should be properly responded and helped for enriching their experience and furthering their education.

Limitations and Shortcomings

Radio broadcasting suffers from some limitations and shortcoming as follows:

1. The educational value of radio broadcasting depends merely on the use of the sense of hearing. A continued listening on the part of the students may make them uninterested and non-attentive.
2. It reduces the task of teaching and learning as a one way communication. The students have little opportunity to participate in the instructional activity other than in a passive way.
3. It is difficult to schedule programmes which will be acceptable to the majority of the students. Therefore, teachers and students find it hard to integrate these programmes with their own instructional activities in the school.
4. The students and teacher both face difficulties in having adequate preparation for the utilization of off-the-air broadcasts on account of the paucity of adequate pre-information, and manual or guides.

However, these limitations and shortcomings can be overcome with a little more efforts on the part of the teachers and the concerned authorities. If we utilize the full potential of the radio, it may found to be very beneficial as an instructional tool for the teaching of any subject.