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MOTION PICTURES AS AN AID TO EDUCATION

BY

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CHAPTER XXVII.

MOTION PICTURES AS AN AID TO EDUCATION.

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DEVELOPMENT OF MOTION PICTURES.

The first photograph of the human face in motion was exhibited in a photographer's window in Sloane Street, London, England, in 1889. This crude attempt was made under great difficulties. William Friese Greene, the experimenter, made his own film, emulsionized it, cut it into 20 or 25 foot lengths, and projected it with the same mechanism he had used in his camera for making the negatives. The experiment was largely commented upon in the papers of the time. This was a decided advance upon the zoetrope and Edward Muybridge's experiments with a battery of cameras whose shutters were released by snapping a series of threads as trotting horses passed and broke them.

Simultaneously with Greene in England, Thomas A. Edison was making his experiments in America with the kinetoscope. The American Mutoscope Co. also brought out their machine about the same time. In the kinetoscope the pictures were arranged on long strips of paper which moved rapidly before the eye of the observer who peered through a lens. The mutoscope was also arranged for a single observer, but in it photographs on paper were attached to the edge of a wheel which in revolving flicked the pictures into view as one would flick a pack of cards from the edges. Both these machines were extensively used at fairs and "penny arcades."

It was only when George Eastman perfected the film so well known at the present day, that cinematography made any material advance, for the long film made it possible for the first time to get satisfactory results. Then the Messrs. Lumiere, in Lyon, France, made their machine for projection on the screen. The Messrs. Gaumont followed. Simultaneously Marey and Demeney, of Paris, began their experi-

ments, making great improvement in the mechanism of both the camera and the projecting machines. During the next five years makers of cameras and of projectors sprang up everywhere, each vying with the other to do something better than his fellow. From 25-foot lengths the film was extended to 50. Then a method of joining was discovered, which made it possible gradually to increase the length of the negative film to 200, 300, or 400 feet, and the positive to the present-day reel of 1,000 feet.

The popularity of cinematography (the name was coined by the French manufacturers) grew so rapidly that the manufacturers could not supply the demand and the showmen became manufacturers. At the present day, pictures and machines are made in every quarter of the two hemispheres.

At first the pictures were mediocre in quality and ridiculous in treatment. They were almost exclusively devoted to comedy of the "slap-stick" type. The novelty of movement in pictures was so great that the quality of the subjects was overlooked. The public soon tired of such pictures however, and in response to the evident demand, manufacturers in England began to photograph scenery, pleasure resorts, seaside views, fire-brigade drills, and the like. The example was followed in other countries, and a high degree of excellence was attained, especially in France.

The Boer War gave the first real impetus to the industry. Mr. Charles Urban, of London, dispatched to South Africa a staff of photographers, who sent their negatives to England for development; and all over the world scenes of the war were flashed on thousands of screens. Thus originated the "moving-picture bulletin," or animated newspaper. Since then, practically every important event in the world's history has been written on cinematograph film, instructing thousands in a language that can be understood by people of every nationality.

During the period of progress, it was often difficult to find suitable subjects, and anything the manufacturers chose to foist upon the public was exhibited by the showmen. Many of the subjects were French, and they may or may not have satisfied French audiences; but when they were imported to America and England some of them proved to be entirely too broad for the more particular tastes of those countries.

Gradually the practice arose of forming stock companies to act complete plays under the direction of full-fledged stage managers. A new profession grew out of this change, that of scenario writing. At first, the manufacturers exercised little care in the selection of "plays," and apparently took anything that was submitted to them, paying from $5 to $15 for a "script." These were frequently based upon train robberies, hold-ups, burglaries, shootings, murders, elopements, and domestic infelicities more or less questionable in tone. These films were made by the thousands, until an outraged public raised a protest, and the authorities of various cities began to censor some of the most flagrant violations of decency. Then pictures of cowboys, "Wild West" stories, made-up Indians, and similar subjects were made to head the list. These are now rapidly dying out, and elaborate and carefully staged pictures, such as biblical, mythological, historical, and classical plays are now given prominence.

During the process of evolution has come the demand of intelligent audiences for a larger number of high-class films. Charles Urban, of London, has been notably successful in meeting this demand. He saw the need and has tried faithfully to supply it. Pathé Freres, Gaumont, and Eclair, of Paris and America, are ably supporting him, and to-day a great number of excellent scientific, artistic, historical, religious, and other films are available for educational purposes.

CINEMATOGRAPHY IN EDUCATION.

A canvass was made a short while ago by a New York daily newspaper of thousands of schools, colleges, and other institutions of learning throughout the United States. It was found that the institutions were nearly unanimous in favor of teaching by cinematography; and the prediction was made by most of them that the day was close at hand when they would all consider the cinematograph projector and film as an indispensable part of their equipment.

It is contended that the eye grasps facts more quickly and retains them for a longer time than the ear. A class instructed by demonstration and illustration is far better equipped than the class depending upon the spoken word alone. It is possible to illustrate with the moving picture almost every subject, from the kindergarten to the university, inclusive, and pictures could easily be made to follow the textbooks.

In preparing scientific films for general use the greatest difficulty is to make them in such a way that they can be easily understood. In the films of history and classical literature there is another and graver danger—that of misrepresenting facts. There have been many such films made which are useless for educational purposes for that reason alone. Many a director has sacrificed truth because he thought the story could be more dramatic or because in some way it suited his purpose better if changed. Imagine the doubt in the minds of school children. In more than one actual instance in the New York schools the question has been asked by pupils whether the moving picture or the textbook was correct. The exhibition of such films should not be allowed. So important is the matter that the board of education in every city or town should have the power to prohibit

the exhibition of them. Whether of art, science, history, or literature, the pictures must be correct in every detail.

Films available for educational purposes are manufactured by several foreign firms, who ship them to this country, and through various agencies endeavor to create a demand for their wares. But the business of distribution is practically in the hands of a few men, who are making greater profit from the amusement side, and little advance has been made in introducing strictly educational films. No manufacturer in this country is enterprising enough to make any quantity of such films. Nevertheless, the films already available cover a large field and are easily procurable from England, France, Germany, and Italy. Those made in America are confined almost entirely to experiments with chemicals and liquid air and a small number on subjects in hygiene. A few made under the supervision of scientists are not available for general use.

The following is a partial list of subjects upon which excellent films may be obtained:

Aeronautics	Fisheries	Natural sciences
Agriculture	Forestry	Optics
Applied sciences	Geography	Physics
Apiculture	Geology	Pisciculture
Archeology	History	Physical culture
Architecture	Hydraulics	Railways
Army and Navy	Hydrography	Scenic views
Athletics	Industries	Seismology
Ballooning	Literature	Sports of various countries
Chemistry	Mechanics	Surgery
Classics	Microscopics	Travels
Dances (both civilized and barbaric)	Mining	Volcanoes
	Music	
Fine arts	Mythology	

Each of these headings may be more fully amplified. Agriculture includes such subjects as irrigation, works on new farms, clearing the land by donkey engines, blasting tree stumps and rocks with dynamite, sowing wheat, reaping, thrashing, etc., potato culture, cattle ranching, rice culture, growing stalks, transplanting, irrigating, milling; modern methods of mowing and haying; corn and wheat harvesting; sheep ranching, shearing and gathering wool; cider making; culture of tobacco; cotton cultivation; the maple-sugar industry; pine-apple industry; mushroom culture; tea planting, and numerous others.

Aviation and aeronautics show balloon ascensions and panoramic views taken from them of the country beneath. Spencer, Santos Dumont, Phillips, Forman, Wilbur Wright, and practically the whole army of aviators and their flying machines contribute to these subjects. Count Zeppelin's various models of dirigible balloons are also

represented. Then there are the war balloons and dirigibles of several countries, and the events of aero clubs.

The industries pictured cover a wide range. The titles of some of the subjects are: Wood carving, chain making, clog making, constructing locomotives, glue making, ice harvesting, working of steam laundry, making pottery, manufacturing barrels, manufacturing steel rails, charcoal making, and marble quarrying. Manufacturers adding to this list from to-day are covering every conceivable field lending itself to reproduction by the camera.

Under "Ancient and modern architecture" are found, in many pictures, ruins all over the world. Ancient Rome, the Forum, the Coliseum, Athens and the Acropolis, ancient Sicily, Pompeii, ancient castles, fountains of Rome, the Alhambra, abbeys and cathedrals from the earliest years of the Christian era to the present day.

Army pictures illustrate all branches of the service in practically every country. Naval films cover the various navies, their battleships and maneuvers, the launching of war vessels, the life and drills of the sailors, and the life and drills of cadets at the naval academies.

"Natural science" covers an immense field: The life history of the moth, showing the laying and the hatching of the eggs, the feeding and development of the caterpillar, the weaving of the cocoon, and the final emerging of the moth; the gradual development from the early stages of the embryo of the chick, shown by the X ray, to the hatching; various wild birds in their natural surroundings, their nests, young, etc.; the growth and blossoming of flowers. Innumerable pictures of all sorts of animals, both wild and tame, belong in this list, besides the many of inanimate nature.

Pisciculture and fisheries are represented by pictures taken in many parts of the world. Some of the subjects are: The Scotch herring fishery; Rogie Falls and salmon fishing; fish traps, Columbia River; hauling in a big catch; hauling in seines and pulling seines into the boat; unloading fish at cannery; catching trout for spawning; spawning trout; hauling in nets at Vancouver; trapping salmon on the Fraser River, B. C.; tunny; quail fishing; angling in Norway.

Among the most interesting and the most wonderful are the microscopical pictures taken with cameras fitted with microscopical attachments. A few of the subjects are: The amoeba; circulation of protoplasm; circulation of blood in a frog's leg; circulation of blood in the tail of a gold fish; ciliary movement in the gills of a mussel; typhoid bacteria; cheese mites; head of a house fly; paramecium; young oysters; living bacteria.

Railroad films are gathered from many sources. They comprise those taken of the various workshops, where all parts of the cars and locomotives are made; the preparing of roadbeds; the laying of

rails; and innumerable scenes taken along many of the railroad systems of all countries.

A few films listed under "Sports and athletics" are: Cross-country running on snow shoes; exciting steeple chase; hockey match on the ice, Montreal; hunting big game in Africa; in the jungle, and native sports; Indians at work and play, Carlisle; long distance horse race, Stockholm, Sweden; pole jumping by the Borneo natives; ski jumping, Norway; surf-board riders, Waikiki, Hawaii; Swedish army gymnastics; tobogganing, Montreal, Canada; water sports, Lakat Datie, Borneo.

"Surgery" comprises operations of various kinds. Dr. Doyen, of Paris, heads the list with operations on tumors, diseases of the nervous system, and general surgery. Several attempts have been made by surgeons in New York along similar lines, but no concerted action has been taken to give to the profession the results obtained. The catalogues and lists published by Charles Urban, London; Gaumont Co., Paris and New York; and the Eclair Co., Paris and New York, contain many films suitable for medical schools.

The following is a sample program given in New York City and repeated to capacity houses on several occasions.

No. 1. Geography: The banks of the Ganges for many miles, showing the massive stone buildings and temples, the burning Ghats, and the cremation of the dead; showing the peasant life in Russia; a band of Cossacks on the march.

No. 2. Agriculture: A model farm in Argentina; the methods of farming; judging prize horses, cattle, etc.

No. 3. Ornithology: Eider ducks; royal swans; sea gulls; pelicans, snipe, and avocets; methods of feeding; their nests and young birds.

No. 4. Natural history: Feeding caterpillars; weaving cocoons; the moth emerging; development of its wings until ready for flight; an otter diving under the water, seizing a fish, and devouring it.

No. 5. Pisciculture: Method of procuring eggs from fish; placing them in the hatching troughs; hatching the eggs; the young fish; method of shipping eggs and fish.

No. 6. Literature: Part of the story of Hiawatha, carefully and correctly arranged and acted at and near the Falls of Minnehaha.

No. 7. Chemistry: The action of acids upon aluminum, magnesium, and other minerals.

No. 8. Botany: The gradual growth of a snowdrop from the time it first peeps from the ground until the buds open.

No. 9. Embryology: The first sign of life in the egg; the gradual development of the embryo until the chick breaks through the shell and finds himself in a new world.

No. 10. Physical culture: Drilling of the boys at Reedham Orphan Asylum, London, England.

This program would prove interesting to audiences everywhere. The exhibition lasts about two hours.

OBSTACLES TO THE USE OF FILMS IN SCHOOLS.

After enumerating such a list of subjects available for use in teaching circles, the question may very naturally arise in the mind of the reader: If there are good educational films on the market, and so many teachers, educators, lecturers, etc., who need them in their everyday work, why do they not use them?

In enumerating the difficulties it may be said that some of these films were made for commercial purposes, pure and simple. All through the films the makers' names appear, and in many films love stories are interjected to meet the tastes of the audiences of the small theaters. These films go the rounds of the shows and are then withdrawn and placed on the shelves of the manufacturers. Many of them could be used in the classroom, provided the names of the manufacturers and similar advertising matter interlarded throughout the films were eliminated.

Another drawback is the slow financial return to be made by the handling of educational films, in consequence of which the business is neglected. The number in this country is not sufficient, and when these are asked for at the exchanges or centers of distribution the films needed are almost invariably somewhere else, and the teacher who wishes to illustrate some special theme on a certain day learns that he must wait a week, two weeks, or even a month. Becoming disheartened, he abandons his project. If the teacher wishes to purchase the special film or films, he is told he must wait until they are obtained from England or France, and again the delays of the boats and the customs make it almost impossible to secure the subjects for at least a month. This makes it very difficult for him to arrange his class curriculum.

Again, it may be that, having secured a few films and used them to advantage, he needs to exemplify more fully the special study. Going to the usual trade channels, he is confronted with the fact that there are no such other films. To make the subjects he needs may cost the manufacturer from $500 up. Who is to pay for this, the teacher or the manufacturer? The teacher can not afford it; the manufacturer will not. What is the teacher to do? He must make these films himself or go without them.

Another obstacle to the use of films in schools is in the city ordinances and State laws, which restrict the operation of projecting machines. In New York City an operator must obtain a license from the board of water supply, gas, and electricity, and similar licenses are required in many other States. There is often difficulty, too, in providing the machine house, or booth, required by the board of fire underwriters. If a school wishes to give an entertainment, a

license has to be obtained; an inspector from the license bureau must examine the electrical fittings, a booth must be erected, either of asbestos, brick, concrete, or iron, fireproof and nearly air proof—a death trap for the man who operates the machine. Then the fire insurance people increase the insurance rate by 50, 100, 150 per cent, because, they claim, that there is great danger from fire. But the danger is so infinitesimal that it seems absurd to saddle the industry with such restrictions. In the 1912 report of the fire marshal for the State of New York 8,165 fires were reported, of which only 9 were said to have been caused by moving-picture machines. Every reputable machine to-day is made fireproof. Either the Power Cameragraph, the Edison Kinetoscope, the Motiograph, or the Simplex could be used in the midst of the audience with perfect safety.

These are a few of the obstacles, none of them insurmountable, and concerted action would probably eliminate them.

HOMEMADE FILMS ARE ENTIRELY PRACTICABLE.

The time is rapidly approaching when every university will be fully equipped with cameras, perforators, printers, and all the appliances necessary to make their own negative and positive films. Several kinds of small cameras suitable for this work are already procurable, and if it is desired to go into more elaborate work, many good makes of professional cameras are at the disposal of the experimenter. Many institutions of learning have photographers and slide makers who could easily learn to operate a motion-picture camera.

These negatives should be available for purchase by some firm making a specialty of educational films, or they should be loaned, on an interchangeable system, from university to university. To illustrate: Suppose Prof. A, of Illinois University, has a series of negatives on physics, while Prof. B, of New York University, has a series of negatives on microscopic subjects, bacteria, etc. Illinois wants microscopic negatives, and New York wants physics negatives. An interchange may be easily made.

In practically every university and college there is an electrical department, and laboratory assistants and students can easily qualify to operate a machine. In high and grammar schools the engineer or his assistant would be the one to do this work.

SOME OF THE ADVOCATES OF MOTION PICTURES.

At the present time a combination of earnest men is in course of formation to bring together the various films already made and to add to them, from time to time, such subjects as may be required. In foreign countries the films are used in the Universities of Berlin and Heidelberg, and in the medical and surgical schools of Vienna. In

France, Paris and Lyon are the centers; in England: Kings College, London, Cambridge, Oxford, Birmingham, Leeds, and Manchester; in Scotland: Edinburgh, Glasgow, and Aberdeen. In Sweden, Stockholm seems to be the only city in which educational films are extensively used.

Great credit must be given to Dean Reber, of Wisconsin University, for organizing an educational film service in that State. Wisconsin, so far as can be learned, is the first State to attempt a systematic use of these educational films for instruction in the schools. Dr. Reber has organized districts, mapped out the curricula, and is, this season of 1913–14, sending to each district, town, or city a series of films in circulating-library fashion. This experiment will be watched with great interest, and if the supply of films can be made to meet the demand, it is probable that other States will follow the lead of Wisconsin.

The State of Minnesota has also found help in the use of Cinematography. The College of Agriculture has made films, not only for its own use, but has supplied the trade and other colleges with films on this subject. A course of lectures is given in the schools of town and country for the benefit of farmers.

Another active movement of education is that of The American Safety League, having main offices at Los Angeles, Cal., and Newark, N. J., and branch leagues in Portland, Me., Seattle, Spokane, San Francisco, and San Diego. Lecturers visit the schools and instruct children how to avoid accidents from automobiles, railway and street cars, using lantern slides and motion pictures for illustration.

Special films have been prepared for the use of social service workers, the societies for the prevention of tuberculosis, hygienic and fresh-air workers, and the temperance movement. One use of the pictures is thus explained in a paper augmented with moving pictures, by Dr. Walter W. Roach, of Philadelphia, supervisor of medical inspectors for the department of health and the board of public education:

> The effect of fresh air is to create a desire for exercise—a natural physiological demand for increased circulation. To meet this need we provide a series of short physical exercises at frequent intervals between lesson periods, designed to promote normal chest expansion and deep breathing; never prolonged, however, to produce fatigue, nor violent enough at any one time to excite perspiration.
>
> For the purpose of illustrating a paper read by the writer at the Fourth International Congress of School Hygiene, at Buffalo, in August, 1913, permission was secured from the parents, and through the courtesy of the school authorities we took a motion picture of the Bache School children at class. This moving picture shows actual schoolroom conditions and the exercises. Such can be copied and taught by any teacher, once they are fixed in the mind. It is an educational film, produced for the good it may do, and is at the disposal of any committee seriously engaged in an effort to secure an open-air class for children who need such schooling.

Almost any manager of a motion picture house will accommodate such a committee by running the reel in private to explain the idea to school board members or parents. This requires only about 10 minutes, as the exercises are abbreviated to show the principles involved for a definite end. The other requirements are transportation charges, prompt and safe return of the film, with a proportionate cost of the wear and tear to replace it, for it is calculated that the celluloid film has a limited life based upon the number of times it is used for exhibition purposes.

MOTION PICTURES IN COLOR.

All the foregoing remarks refer only to black-and-white photography. This paper would not be complete without special mention of cinematography in colors. Many attempts have been made to take photographs in the colors of nature. Dr. Joly, of Dublin, Frederick E. Ives, of New York, Messrs. Lumiere, of Paris, Sanger-Shepard, of London, and others, have made successful pictures of still life and have tried to solve the motion picture in colors. It was left to Messrs. Charles Urban and G. Albert Smith, of London, to bring this problem to a fairly satisfactory solution.

"Kinemacolor," as the process is called, requires specially sensitized film, and the pictures can be made only where there is strong sunlight. Therefore, it is available only during certain months of the year, except where there is brilliant sunshine all the year around, as in the Southwest.

Kinemacolor is particularly useful for showing chemical experiments, inasmuch as the various changes are reproduced in color. There are few branches of the curricula of the schools in which this process can not be used to advantage. If the history courses are illustrated by pictures staged carefully, with due regard to costumes and manners of the period, the lessons taught will be of great benefit. Geography of any particular country can be readily shown, bringing the natural colors before the eyes of the pupils in a manner not possible with the black-and-white pictures. In all departments of natural science the value of this process is apparent.

Many notable scenes and ceremonies of great historical value have been recorded by kinemacolor. Among them are the coronation ceremonies and procession in England, the investure of the Prince of Wales, the Durbar, the Panama Canal, and the inauguration of President Wilson.

Still another process of cinematography in colors is that of the Gaumont Co., of Paris. Their process differs from that of the kinemacolor in that it uses the three primary colors, while kinemacolor uses only two, one primary and one secondary (red and green). Some very beautiful experiments show flowers, fruit, and scenes in rural life.

Both these processes require stronger projecting machines, more powerful arcs, and motors to drive the machine. Kinemacolor

doubles the rapidity of projection of black-and-white subjects, while the Gaumont process requires two and one-half times the speed. Ordinary projection requires approximately 15 to 25 amperes of electric current to illuminate the film, which moves at the rate of 16 pictures per second. Kinemacolor requires 50 to 60 amperes for illumination, and the film moves at the rate of 32 pictures per second, while the Gaumont process needs from 60 to 80 amperes to illuminate, and should have a rapidity of 40 pictures per second.

Comparing the two processes, black and white with the color, the question may arise: If these color pictures are so much superior, why use the plain film at all? The reason is obvious. Ordinary films range in length, according to scene and subject, from 50 to 1,000 feet. To photograph the same subjects kinemacolor requires from 100 to 2,000 feet and Gaumont 125 to 2,500 feet. From the force of necessity the cost of material doubles and trebles. Cameras and projecting apparatus cost more, and much more expert operators are required, both to take and to project the pictures.

CONCLUSION.

The foregoing article is sufficient to show at once the wide field and the deep significance of educational cinematography. In almost every subject in the curricula of schools, colleges, and universities, the cinematograph has already lent valuable aid. Within the next decade the moving pictures will be the indispensable adjunct of every teacher and educational lecturer. On the public platform the cinematograph will inevitably have its recognized place, and it may even invade the pulpit. As the attention and interest of educators are more and more drawn to its merits, the future usefulness of the educational cinematograph bids fair to surpass the predictions of its most sanguine advocates.