

Teaching methodology for the utilization of cinema in the teaching of medical microbiology and infectious diseases.

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Summary

Cinema, since its beginning, has been and is a social thermometer of the first magnitude reflecting the inequities of the population, among them are infectious diseases. The causal of images, sounds, and feelings that appear in the field support a very valid teaching resource, capable of complementing the classic teaching method and adapting the dynamic art of teaching to the actual educational tendencies. If the definition of objectives and the teaching design are obligatory stages that should always be realized with rigor, in a method like this, because of its characteristics and youth, the control should be more exhaustive –before, during and after its execution- to avoid the “trivialization” to gain the maximum teaching efficiency that depends no as much on the material utilized (and its fundamental selection of films to accompany every unit taught) like the use that is made of it.

Key words: Cinema, Infection, Disease, Health, Teaching.

Introduction

Disease, like human reality, individual and social, has had and constantly has different artistic expressions in all the ages and cultures since Paleolithic times until now. Mummies, statues, codes, hieroglyphics, papyrus, codices, painting, sculpture, literature, music, comedy, photography, cinema, ... all of them talk about disease^{1,2,3}.

Cinema is possibly the most complete artistic demonstration at this time for expressing disease as you have already seen, heard and felt. Practically no disease escapes your eye and, although the reflection of the pathology is the priority when “watching cinema from a medical point of view”, your transcendent analysis of the appropriate influencing disease, besides, in its consequences – individual and social – and in the feelings it provokes. This omnipresence of the disease in the cinema is logical, cinema already tells human stories, stories that interest man because they are reflections of his life, of his feelings and of his death and a supposed enormous wealth of images and sounds.

Possibly the psychiatric disorders –and the correct psychiatric analysis of human conduct- have been the pathologies most frequently reflected: *Gaslight* by George Cukor (1944), *Spellbound* by Alfred Hitchcock (1945), *One Flew Over the Cuckoo's Nest* by Milos Forman (1975), *The Silence of the Lambs* by Jonathan Demme (1991), *Hannibal* by Ridley Scott (2001), *Sé quien eres* by Patricia Ferreira (1999) of *A Beautiful Mind* by Ron Howard (2001) are only a few of the well known examples.

But the sensorial alterations, the degenerative diseases and fundamentally, at this actual moment, the oncological problems⁴, etc. are the protagonists of a multitude of movies. *Dark Victory* by Edmund Goulding (1939) with Bette Davis as the protagonist reflects the life of a female brain tumor victim. *Dying Young* by Joel Schumacher (1991) narrates in detail the emotional evolution of a patient with leukemia. *Lorenzo's Oil* by George Miller (1992) reflects a parent's fight against “academic” medicine. *Medicine Man* by John McTierman (1992) tries to open the door of hope on the fight against cancer through two key facts

in the investigation: an accident and the capacity of observation. *Go now* by Michael Winterbottom (1995) tells the story of the producer, Paul Henry Powell, afflicted with multiple sclerosis. The same disease affects the cellist Jacqueline du Pré, through life and death it is reflected in *Hillary and Jackie* by Anand Tucker (1998). *The Mighty* by Peter Chelson (1997) based on the novel by Rodman Philbrick in which he relates the story of an adolescent with the Morquio syndrome and reflects the transcendence of the disease to not only those who suffer from it but also those that are around it, etc.

Infectious diseases, with an important social impact, by their transmission, frequency and mortality associated with them –are responsible for 17 million deaths a year, 1/3 of all deaths- cannot be unaware of a social thermometer of the first order like the cinema. It is rare in films that, in one form or another –as axis or argumentative determinate (infection by HIV and AIDS in *Philadelphia* by Jonathan Demme, 1993), draws back the curtain on the action (the plague in *Shakespeare in Love* by John Madden, 1998), mentions [leprosy, the plague, tuberculosis... in *There's Something About Mary* by the Farrelly brothers, 1998] or reflects like a work more of the life of the characters [common cold in *You've Got Mail* by Nora Ephron, 1998 or gastroenteritis represented in *La gran familia* by Fernando Palacios]- the infection is not present. In many cases, although their presence is minimal, important aspects of infection are represented: the symptomatic entourage [*Saving Private Ryan* –gaseous gangrene from a war wound that “smells like cheese”- by Steven Spielberg, 1998 or *The Green Mile* –dysuria and frequency- from a urinary tract infection- by Frank Darabont], the epidemiology [*Lord of the Flies* by Harry Hook in 1990 -transmission of trichinosis impart by uncooked pork-] or treatment [*In the Line of Fire* by Wolfgang Petersen, 1993 –symptomatic treatment of the flu-]. In others, the infection has sufficient identity to be the authentic protagonist, to construe that we can dominate cinema “of and about infection” –the plague in *Panic in the Streets* by Elia Kazan (1950), the HIV virus and AIDS in *Philadelphia* or in *And the Band Played on* by Roger Spottiswoode (1993), hemorrhagic fever by the Ebola virus and epidemiological research in *Outbreak* by Wolfgang Petersen (1995), the pathogenesis of an infectious disease view “from inside” in *Osmosis Jones* by Bobby and Peter Farrelly (2001) or whatever tape of bacteriological war- undertaking very ample aspects from a suspected diagnosis to treatment and set up an authentic Treatise of Microbiological Medicine and Infectious Diseases if “you know how to read” adequately. This

is the job of the professor, to teach how to “read” and “understand” Microbiology and infectious diseases in the cinema^{3,5}.

What justifies the use of cinema in the teaching of microbiological medicine and in the divulging of basic knowledge about medical themes related with this area?

In the last few years, teaching has felt the jerk of an urgent need to adapt and evolve the methods in the means of teaching that make the act of teaching more dynamic and break away from the stale education perpetuated by tradition and demonstrate more accord with social changes and the technological advances of the last few years. The introduction of these changes is already a necessary benefit of an integral and high quality formation, in the creation of students and motivated professionals and in the permanent search for knowledge and solutions.

In this sense, audiovisual technologies, among those the cinema, with their incomparable capacity of established representation is one of the most powerful methods for the spreading of knowledge, the development of aptitude, and the creation of attitudes.

The occasional projection of certain films or fundamental documentaries is one habitual practice in determined disciplines. Nowadays, and every time with more frequency, it is already established in different disciplines of Medicine that the cinema *per se* supposes the “real” reconstruction of the disease, shedding light on an integral form of the disease from a medical, historical, cultural and, including, an ideological perspective.

Nevertheless, we propose a new approach, the complete study of a discipline (Microbiology) through the cinema. We consider this a teaching method that is active, dynamic (the student collaborates in the attainment of the objectives), pertinent (concordant with the educative programs) in which they join efficacy (capacity to obtain the proposed results) with efficiency (...the easiest form possible) (table 1).

Our experience, developed since 1997-1998 course, centered on the teaching of Medical Microbiology as an elective course, designed for students in the area of biosanitary in complement to the normative in force that establishes that at least 10% of degree credits should be from classes that permit the student the free configuration of their academic curriculum, and third year studies. This philosophy already makes more sense during these times that we encounter before the defiance of a new modification

of all study plans because of the European Convergence⁶.

In these precincts and from the perspective of an integral and quality education, the cinema constitutes a very large and flexible resource that is capable of complementing the classic teaching methods and improves the students' level of experience. Nevertheless, and in accordance with the obtained results, we think that your field of application could be much more extensive, including from degree studies to sanitary education of the population, passing for continuing formation of professional doctors, sanitation workers, etc.

Dynamism	
Appropriateness	
Promotion of the interes and the active attitude	
Better profesor/student communication	
Joins academic and recreational aspects (efficiency)	
Reinforce	Learning Learning by memory Learning by association

Table 1: Main characteristics of teaching based on cinema.

This model, in agreement with our experience, constitutes a very valid way to foster interest and an active attitude from the students that benefit and results in the formation based on a personalized learning process. Besides, it bears implicit better student-professor communication and an irreplaceable exchange of ideas between both. And, perhaps the most important, joined together, almost imperceptibly, the academic and playful aspects. In this sense, the sensorial and emotional impact of the cinema assumes a better educational reinforcement through the proportion of scientific images and facilitates the work of learning by heart and association. Serving as examples; dysnea in *Moulin Rouge* by Baz Luhrmann (2001), the hemoptysis in the aforementioned case *Moulin Rouge* or of *Celestial Creatures*, the shocking lionine facies in *Papillon* by Franklin J. Schaffner (1973), the aerosol of *Estallido* or oral herpes in *The Witches of Eastwick* by George Miller, 1987.

In any case, it is a method very adapted for the teaching of managing and evaluating critical different bases of bibliographical data (medical and cinematographical), irreplaceable tools in the search for information^{7,8,9}. The same cinema is an immense database that is necessary to understand and contrast through a connection exercise with different medical texts.

Besides, the cinema assumes a very valuable medium in the creation of habits in the teaching-learning process: observation, reflection and investigation. The work of professors is to filter, complete, correct and motivate the students until the attainment of the proposed objectives.

How can you plan and structure the teaching of medical microbiology and infectious diseases through cinema? Teaching design

The sequence of elaboration of whatever teaching method should be logical, coherent, structured and channelled to give responses to two basic questions: “What do you plan to communicate and teach to them?”, “How will they accomplish it?” and they are implicitly carried from the formulation of objectives until the evaluation (figure 1).

If the definition of the objectives and the teaching design are obligatory stages that should always be realized with rigor, in a method like this, because of its characteristics and youth, the control should be more exhaustive –before, during and after its execution- to avoid the “trivialization” of the object material of study. The students –and the professor- should have a very clear showing of the film, a fundamental part in the integral formation and of a quality university student, its reinforcement, a reason that doesn't exclude nor substitute in any case the conveyed teachings of the professor.

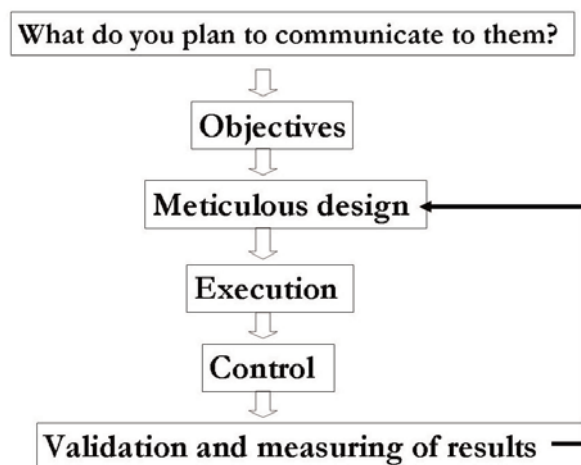


Figure 1: Structure of the teaching

Therefore, in order to develop all of their potential it is necessary that for so many objectives like the teaching design they adjust the possibilities and limitations of this “new” resource. And for it the previous necessary flow has set the base that makes possible the correct interaction between the student,

the professor and the teaching itself, the objective material of study. In this sense it is fundamental to define the enclosure of the teaching. It is irreplaceable that the students have some minimal previous knowledge, a referential frame that permits comprehension, the integration of knowledge and criticism. This point is basic in the field of free election –utilized in multidisciplinary courses-, postgraduate courses, continued education and sanitary education of the population.

The **objectives**, specific and adapted to the different programs –free election, third cycle, degree- should be marked for its pertinence and be logical and realizable, precise and medial through a harmonious system of evaluation and significance.

Your definition, like consequently the teaching design, should already be characterized by the flexibility that should be permanently subjugated to the “exam” evaluating the agreement with the knowledge like the “spiral of education” (figure 2) ¹⁰.

For the **design** (figure 3, table 2) is the proposed obligatory lecture of Alicia Salvador¹¹ that realizes a magnificent introduction to the theme and has a bearing on the basic points that are there that have an account to elaborate a teaching design of these characteristics. The key to efficiency isn't so much in the didactic material employed except in the use that it has been given.

1.- Selection of the film

First of all, it is necessary to stress that you only use fiction films. Although the utility of documentaries is evident, we don't pretend to substitute an “authoritative” lesson for an “authoritative” documentary (in the wider sense or the word) except when using removed motivating resources of teaching based on the storage of information.

The arsenal is very wide, until the point of power considered that the infection is a common

characteristic of universal cinema, without distinction of genre, age, culture, etc. Infection in the cinema is much more than science fiction though this is possibly the most known facet. *Jezabel* (yellow fever) or *Panic in the Streets* are films that aren't well known in which infection appears in all (or nearly all) and contribute a multitude of data of great teaching interest.

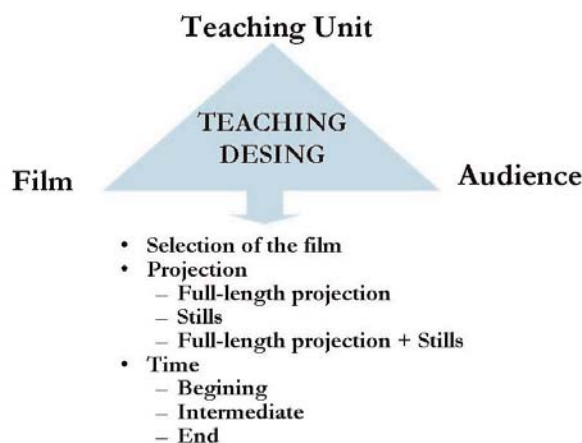


Figure 3: Teaching design

In any case, the microbiological investigation (*Dr. Ehrlich's Magic Bullet* by William Dieterle, 1940), the systems of security and the manner of dress in high security laboratories (*The Henderson Monster* by Waris Hussein, 1980), the transmissibility (*Asbani Sanket* by Satyajit Ray, 1973), the quarantines (*Bye Bye, Love* by Sam Weisman, 1995), the biological war and the bioterrorism (*Adrenalin: Fear the Rush* by Albert Pyun, 1995), the proceeding microorganisms of space (*The Andromeda Strain* by Robert Wise, 1971) ... are very attractive for the cinema for their esthetic impact and for the connotations of insecurity and fleetingness of human life in front of the forces of nature.

So, in general but fundamentally in this last case, the work of the professor is arduous because the cinema shows the disease, in the majority of occasions, riding between reality and fiction, searching for visual and emotional effects that guarantee an impacting plot and, in some cases, the commercial success of the film. For the cinema is full of scientific aberrations –unthinkable taxonomical “associations” (the malaria virus in *Adrenaline*), miracle cures (“magical” serum so rapid in production that its effect is immediate like in *Outbreak*), astonishing transmissions (*Braindead*, 1992), impossible vectors of temporal-space necessity (*Mimic*, 1997) or esthetics (the only demonstrations of cholera in *Le bussard sur le toit*, 1995 are dizziness and death-), sensationalism (*Alien Nation: Dark Horizon*, 1994), partisanship, etc.

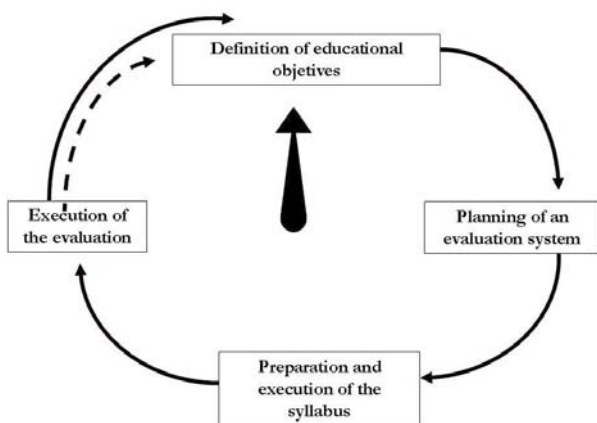


Figure 2: Spiral of education

Besides, all of these initial errors are associated with multiple decisions in the assembly, dubbing (incorrect translations, ...) that, on occasion distort the treatment given to the theme in the first instance. Nevertheless, until these “errors” can be positive, from one teaching point of view, constitute a “negative” reinforcement of great mnemonic impact.

Selection of film /infectious disease		
Introduction	Etiology	
	Epidemiology	
	Clinical syndrome	
	Diagnosis	
	Treatment	
	Prevention	
Introduction of the film	Cast and technical details	
	Comments	Context
		Time
		Atmosphere
		Filming year
	Historical reference	
Watching		
Final comment: The sequence breakdown of stills and the very important dialogues in Microbiology and Infectious Diseases		
Complement: sequences of other films, picture...		
Bibliography and complementary readings		
Proposal of questions and activities to investigate		

Table 2: Teaching unit example

Selection criteria:

1. Films on hand- preferably in Castellan-. The original versions (o.v.) are preferred to the dubbed versions although their use is not always possible or recommendable. A classroom that is validly wide and projection monitors that permit a fluid display of the subtitles. These problems can make up for endowed technologies to the rooms with adequate projectors formatted for DVD, besides that, in dubbed versions allow subtitles as a means to help students that have hearing disabilities. The original versions, in part to avoid translation errors, have a proven track record of integral formation: in a multitude of films the original language is English, the scientific language of excellence which they are going to have to confront during their studies and professional development.

2. Minimal and indispensable cinematographic quality, although for our predominant interests the pedagogical aspects, the representation of the infectious disease and the medical “semantic” and the infection of the film.

3. In addition, the selection of attractive films is important. In our experience it is curious to observe the changes in the gestures of the different generations and how classic films like *Gunfight at the O.K. Corral* by John Sturges, (1957) or *The Third Man* by Carol Reed, (1949) doesn’t have the reaction hoped for, creating a certain frustration in the audience and by that the reinforcement of the work is diminished. Although this seems trivial you shouldn’t forget that boredom and the lack of motivation are enemies of learning and this is precisely an arm of this teaching method. You also have to be careful in order “not to hurt their feelings” and to avoid some of the secondary rejection of the course like the studied material.

2. –Film/theme relation

On occasion, although it isn’t common, a specific infectious pathogen is completely undertaken in one film. *Philadelphia* (infection by HIV/AIDS), *Panic in the Streets* (the plague) or *La vida alegre* (sexually transmitted diseases) permit the establishment of epidemiological, clinical, diagnostic, evolutionary, observational, therapeutic and preventative aspects. In these cases a one to one relationship is possible with the film and subject although customarily it is more enriching, demonstrating different points of view and amplifies particular aspects of special importance, realizing a framing inside of thematic units. Obviously they should be ordered, coherent, reflect different situations and points of view that permit a global vision of the theme. Taking some examples of AIDS, a widely used subject the last few years, you can construct within it subchapters: mechanisms of transmission, risk factors –sexual contact, through blood and derivatives, drug dependencies, an incarcerated environment, vertical transmission-, clinics, opportunist infections, treatment, prevention, social aspects...

The major problem with this structure is the temporal adaptation of the topics, being more adequate in the formation of concrete subjects. In a course like Microbiology you shouldn’t invest yourself in an elevated number of hours on one concrete subject like AIDS, forgetting other problems of great medical transcendence, but with little “cinematographic” repercussion it could be Legionnaire’s disease.

You shouldn’t scorn the use of other resources together (painting, literature, sculpture,

music...) that allow better methodological possibilities, better teaching dynamism and collaborate on the integral formation and the quality of the students.

3. –Methods of projection:

a) Integral and collective. Is the common way and form to “watch cinema”. In general, the comprehension is the major thing that permits the cohesion of the different film elements. In another way, the predominance of playful aspects determine a better stimulus and provide better possibilities to the debate in a relaxed atmosphere, and to the already different possibilities of criteria in different situations, that are not the criteria of the professor taken out of context, determine sequences in order to adapt them to there ends, and the student has the option of actively collaborating in their learning process.

b) Projection of the chosen sequences in content function. It is a good complementary method to the full-length showing with the finality stressed in fundamental aspects and to clarify possible “dark points”. As well as complementing the “traditional” teaching to adjust images that possess the right impact of the cinema.

c) Individual visualization of the film. It is a very interesting method for distance formation. If it is realized, computer support permits a guided visualization through diagrams and commentaries previously posted on the internet. Although for your own nature, the dialogue doesn’t form part of the design of this teaching method, the ‘individual’ isn’t in synonymous isolation, and the communication with the professor and with other students can realize through the Internet (chat rooms, email tutorials). Your major inconvenience is that it depends on the technical requirements or the availability of the video library.

4. –Moment of showing

It is basically in the full-length showing. If you opt for the showing of scenes, the most convenient are those that are interwoven with the lesson. In general, the showing should be at the beginning, the middle, or the end.

a) The showing at the beginning acts as a motivating element although, in general, it is an essential introduction element and a detailed analysis of the subject in the last part of the class can be enriched by a debate and discussion. Don’t present every film initially on every occasion, it could be an inscrutable subject or unclear, many elements will not be seen by the student.

b) The showing at the end can be a culmination, an explanatory and encompassing element where the student, already with “cause for concern”, is more capable to understand and to make conclusions. Besides, it also exerts a fixed content function.

5. –Evaluation

Its adaptation with the conveyed teaching is possibly one of the most controversial parts of the teaching. The weight of it is a necessity that constitutes the method, the reliable instrument of measurement to validate some of what measurement that has been obtained by each one of the objectives and the grade of formation reached by the student giving validity to the teaching method utilized, the quality of the teaching techniques, and the teachers.

From out point of view, the most important is the designated *formative evaluation*, the evaluation with teaching finality “per se” but you can’t exclude the designated *certification evaluation*. Nevertheless, in whatever case there should be a means of student-professor interaction. The student shouldn’t only contribute the quantification of there knowledge except, fundamentally, an awareness method of their advance that, at their time, will be an incentive that favours the learning. The faculty should endow the parameter guides to the autocratic and to modify or not the teaching.

The most qualified type of evaluation, for this type of teaching, is the continued evaluation, besides supporting in the investigation and in the consultation and reflection in orientated works and directed by the professor.

The analysis of the results obtained permits effective validation (efficacy and efficiency) of the design and feedback.

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