Interdisciplinarity, Debate And Movie Clips As Highly Motivating Factors In Live Shows—Five Years Of Success

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Abstract. A live show on any subject that includes experiments and continuous interaction with the audience is a well known approach for EPO activities that many are carrying out all over. We present such an initiative with some added ingredients such as interdisciplinarity, the use of movie clips, and especially the debate between the two presenters, a debate that is all the more attractive to the public if it not fully staged but closely represents their actual points of view. José Montesinos, from the “Orotava” Canarian Foundation for the History of Science, is and plays the role of the more mature math professor who has grown weary of the overrated value given in science to mathematics and its consequences. This poses a constant challenge to his colleague, Erik Stengler, from the Science Museum of Tenerife, the young down-to-earth hands-on scientist, who defends the usual view that science and technology are to be judged by their achievements, which have brought about the advancement of modern society. With this approach and as a collaboration between our institutions, we have produced and toured highly successful activities on: Einstein and Relativity (from 2005 to 2008, “Einstein Goes To School,” including a theatre play); circularity, the number $\pi$, forces of inertia and the Newtonian revolution (in 2008/2009, “The Tension Between Circularity and The Straight Line”); and the foundations of modern astronomy (in 2009/2010 “Kepler and Galileo, Messengers of the Stars”). Audiences were very varied—students, adult students, general public, prison inmates, teachers—and all appreciated the presentations as fun, thought-provoking and highly motivating, and valued especially the interdisciplinarity character of the activity. Movie clips have shown to be especially useful to recover the attention of the young when they lose the thread due to the short attention spans they presently have.

1. First Steps: The International Year of Physics 2005

We wish to report on an on-going collaboration between us and our institutions, which both have a strong focus on education and public outreach. With the occasion of the International Year of Physics, we embarked on many projects and activities. One of them became a collaborative effort to bring to school students concepts usually considered too difficult for them, such as those of relativity. With a theatre play and a live show performed by both of us, we managed to get students involved, interested and excited by ideas like time dilation, space contraction, the relativity of mass, the relativity principle and the evolving concept of gravity from the ancient Greeks to Einstein. We usually finished our show pointing out that relativity is not hard to understand, just difficult to accept!
The show was such a success that we were still being asked to perform it at schools as late as 2008. Teachers were thrilled by the possibilities it opened for them to address such topics in class. We often noticed how it was the teachers who really wanted to see our show, with the excuse of having their students attending, for them—the teachers—to have a unique opportunity to grasp ideas they actually were supposed to know. We were also asked to bring our show to the Science Centre Universum in Mexico D.F., Mexico as part of their yearly preparation programme for their explainers.

We think that an important part of the success of our activity was its hands-on and interdisciplinary character, but of course you all are quite familiar with such approaches, as were we, having organized many activities before along these lines. There had to be something else which made this show so special.
2. Second Go: An Historical Tour on Circularity

Let us tell you about the second installment of our collaboration before revealing what we think was key to our success.

In 2008, we thought it was about time to move on to a different show, and, guided mostly by Montesinos’ own research interests at the time, we devised a new one that explored the evolving consideration along the history of science of the concept of circularity or circular motion as opposed to the straight line or rectilinear motion, respectively. This leitmotiv gave us a perfect excuse to talk about the historical approach to science, on how philosophy, theology and science were part of the one and only body of knowledge for many centuries, on the revolution brought about by the mathematization of science, and on physical and mathematical concepts such as the number $\pi$, statistics, inertial forces, the principle of inertia and its key role in the development of modern physics, and also, again, about relativity, this time in reference to its concept of curved space.

As in the previous show, Montesinos would present himself as the somewhat older mathematician, surprisingly weary and critical with the positivist attitude of modern
scientists who rely on science and its mathematical formulation as the only way of exploring the world around us. As you can imagine, it was Stengler’s role to defend and represent the mainstream scientific approach, with experiments and down-to-earth arguments to contradict Montesinos’ more philosophical and skeptical attitude.

Returning to the open question as to what was the key to our success, we definitely believe that it was not only the debate itself that we staged, but the fact that the debate was believable because the attitudes and approaches each of us represented are actually true to our respective views on science and knowledge. We could say that the debate was not staged at all, only carried out in public. Consequently, each show was different and unique, and the audiences did perceive this (maybe unconsciously).

We did perform this second show during the academic year 2008–2009, for a wide range of audiences, such as general public, school students, teachers, and even students of a summer course at the University of Alcalá, in mainland Spain, near Madrid. This time round, however, it did not take us so long to come up with a new idea, and we prepared a third show with the occasion of the International Year of Astronomy 2009, this time focusing on Kepler and Galileo and their roles in the making of modern astronomy.

3. IYA 2009: Galileo...and Kepler!

This time the debate between us revolved around the importance of each of these historical figures and the fact that both of them combined what we now consider sound science with more esoteric and pseudoscientific work. Montesinos would defend the latter as an important part of their career, and I would rather stress the relevance of their discoveries in view of the subsequent evolution of modern mathematical science. But there was also agreement between us, for a change, and it was on restoring Kepler’s importance to balance out the great hype around Galileo that has attracted most attention in all activities of the International Year of Astronomy.

In parallel to this collaborative work, I have developed during all these years a special interest on the use of movie clips as an educational resource and a means for science communication. So, for our Kepler-Galileo activity, I introduced the use of clips of known movies that served our purpose to talk about the motion in the universe—the Galaxy Song from Monthly Python’s “The Meaning Of Life” (Du Prez 1983) and the very useful sequences of the movie “Agora” by Spanish director Alejandro Amenábar (Amenábar 2009). Regardless of the historical accuracy of the movie, which has been under strong debate after its release in Spain and worldwide, the explanations of the conic sections, the heliocentric model of the solar system and the orbits of the planets are much better conveyed if done by Rachel Weisz and Max Minghella, even if they need some extra commentaries by us afterwards.

Again, the show was a great success, and we were amazed this time by the extra preparatory work made in class by some groups of students—now of adult education—that resulted in an impressive exhibition of models, posters, reports and pictures we found in place when we arrived at one of the venues. One of the most satisfying performances was the one we did inside the island’s prison. We expected a difficult time, and Montesinos was especially nervous because it was his first time there. Stengler had been in the prison before—not as an inmate, but carrying out other educational projects in collaboration with the teachers of the penitentiary. The surprise came as we ended up having the most participative and lively show ever, with the inmates volunteering, asking, objecting, and participating in the debate as no other audience did before.
4. A Promising Future

That was our last show so far, but we are already working on the next one and have ideas for two more in line. Our next show will be somewhat more philosophical. Again, following Montesinos’ current research interests, we will address the issue of phenomenology, as a rather critical approach to science with respect to what is considered mainstream philosophy of science. If our debates were always quite real and lively, we anticipate an intense discussion in this one, as our positions are more apart than ever.

After phenomenology, we will turn to the mysterious world of quantum physics, this time proposed by me, as it is one of my major interests in terms of its interpretative questions such as determinism, locality, and all the counter-intuitive phenomena it predicts.
5. Conclusions: The Debate and the Movies

What we would like to leave you with through this presentation is the fact that in addition to interdisciplinary and hands-on approaches, the fact that we embarked in a long-term collaboration has had an excellent result, in which the debate has been key, especially—but not only—because it is more real than just staged. Dissenting approaches to a particular subject have not been an obstacle in our case, but rather a valuable tool to trigger interest and motivate audiences of many kinds.

Also a final word about the use of movies in science communication: people today, especially young audiences, are used to fast-moving quick-response audiovisuals in computer games and action movies, and their attention span is shrinking equally fast. Movie clips have proven to be pivotal to rescue the audience’s attention during a presentation, not only, not even usually, because of the explanations provided within the movie, but mainly because of their popularity and the fact that most of the students have seen the movie and feel the urge to comment, and therefore to come back to the classroom from the dreamworld they might be wandering about 10 or 20 minutes into the presentation.

Acknowledgments. I (Erik Stengler) wish to thank the Organizing Committee for accepting this presentation as a recorded video file. I really wished and looked forward to be here in person, but sad personal matters have retained me in Europe precisely during this exciting meeting, which I hope everyone has enjoyed.
References

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