Letter
A new model for science communication that takes ethical considerations into account
The Three-E Model: Entertainment, Emotion and Education

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Dear editor,

On 5 October 2006, *Nature* illustrated the problems of some radical environmentalists who base their actions on intuition and emotion and deny science as a source of facts or truth. While the news feature by Emma Marris clearly shows the vindictiveness of particular 'anti-science' groups,[1] the editorial proposes to scientists to "*desist from sneering at emotional argument and demonstrate that science is a window through which we can see our world more clearly.*"[2] Now how might scientists do this and also help the public to understand issues more clearly so they can make informed judgments on controversial issues?

For some time now endeavours in science and engineering communication have focused on increasing a dialogue in the communications between stakeholders. This requires an understanding and exploration of the ethical issues of all protagonists in the dialogue as different parties will undoubtedly have differing views of the values at stake in highly contentious issues such as stem cell technology, reproductive cloning, in vitro fertilisation but also on more general issues such as land use and environmental issues. One point however in the methodological discussion on how best to achieve a higher participation of stakeholders in the decision-making processes through dialogues and meetings is grossly overlooked, and that is the problem of involving a large majority of the public who are not interested in such issues. They often have no direct stake in the issue or in the novel technology proposed by scientists and engineers and are not particularly interested in participating in debates. The result is that the opinions of a large group of potential users are left unexpressed, so that when a novel technology is widely introduced this may create a public outcry, possibly supported by emotive messages of radical environmentalists, resulting in diminishing political support and increasing regulatory measures. For this reason a new model is now proposed aiming to reach as many as possible and to involve more audiences in two-way interaction.

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Figure 1 shows the elements of the proposed approach to communication of ethically sensitive biotechnology issues using the Three-E model: Entertainment (getting attention), Emotion (identification) and Education (information and skills for (future) decision-making)). It has been developed on the basis of long-term experience and observation of public communication by individuals in the Department of Biotechnology of the Delft University of Technology.[3]

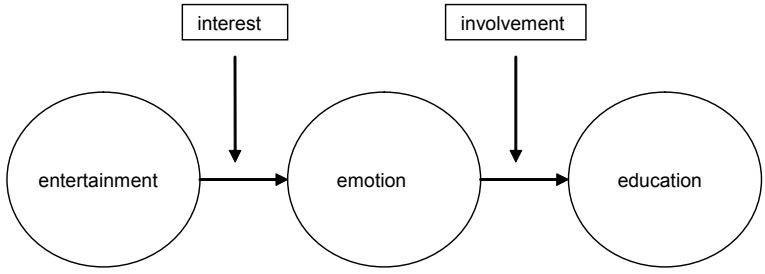

Figure 1.

The use of the model requires knowledge, skills and an open-minded attitude from scientists and engineers involved in the activity, as demonstrated in the organisation of the Science Day activities in 2000 and the *Imagine*[a] project in 2004-6 coordinated by the Delft University of Technology Department of Biotechnology.[3] Some elements in this model are contentious however, such as the balance between persuasion and information exchange, as the goal of effective science and technology communication is the achievement of mutual understanding and appreciation of one another's views. Therefore it is crucial that scientists and engineers are trained in dealing with ethical issues and in recognising the values that different audiences including themselves may accord to these issues.

The Three-E model: Entertainment, Emotion and Education is a simple and universal approach applicable to all kinds of issues and not necessarily limited to biotechnology. Entertainment triggers attention, emotion is found in identification with the subject, education is achieved by the raised curiosity. It provides an alternative for

a. ***Imagine*** is a communication project involving scientists and school students working together to achieve tangible projects in developing countries run by the ***Imagine*** Foundation. ***Imagine*** asks scientists to submit an idea for an application in a developing country each year. Their ideas are then forwarded to schools, where groups of 2-5 school children aged 16-18 years choose the idea they like best and draft a business plan. To bring their idea to fruition, the students must carry out a series of experiments, obtain information on the local situation of developing countries, outline a budget, consider the social issues, etc.

The ***Imagine*** jury of scientists, teachers and development aid workers, chooses the five best business plans. Following this, the school groups make a professional presentation and short video, which are presented at an international symposium. The winning team sees the realisation of its plan. In 2006, the winning project was the redevelopment of a plantation in Surinam to produce valuable colouring compounds, while 2005 saw the extraction and sale of avocado oil from overripe avocadoes. The 2004 winner saw the production of biodiesel from algae in Mozambique.[6]

the long existing AIDA (Attention, Interest, Desire and Action) model that is based on a simple hierarchy of effects and does not specifically involve an approach to include a reflexive element.[4] It also differs essentially from the Entertainment-Education model used in health education for the same reason, because the emotions provoked through the Three-E model are intended to make the underlying values more explicit.[5,2]

The proposed Three-E model does use emotions to involve the audiences, but it refrains from unfounded, often fear-provoking one-liners such as the ones used by some radical environmentalists. An important ingredient of the Three-E model is the implicit explanation of the scientific method in relation to the subject of entertainment. The new Three-E approach will help in affecting a broader audience, involving a larger number of stakeholders and initiating more discussion on moral issues. It therefore also facilitates the easier recognition of possible societal issues and a smoother introduction of novel technologies.

Sincerely yours,

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