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Assessment of an Engineering Ethics Video: Incident at Morales

In universities across the United States, engineering departments are striving to meet the EC 2000 criteria for accreditation, which require that all engineering students demonstrate an understanding of professional and ethical responsibility. Several previous studies, using different instruments, indicated that students who complete a full three-credit course on engineering ethics experience significant improvements in their moral reasoning skills.

Instructional programs in engineering ethics typically use cases, both real and fictional. The video *Incident at Morales* (2003) dramatizes a fictional case in engineering ethics. In this case, a company plans to quickly build a new plant to manufacture a new paint remover. The company decides to construct the plant in Mexico to minimize the cost of environmental controls for the byproducts of the manufacturing process.

We sought to determine whether a short instructional program of 90 to 120 minutes, using the *Incident at Morales* video, could effectively teach students to reason about moral problems, and whether the video could change students' opinions about ethical issues in engineering practice. We selected two different assessment instruments: the standard Defining Issues Test and a five-item survey of statements about ethics in engineering practice.

The five-item survey asked students to respond to the following statements on a five-point scale, from Strongly Agree to Strongly Disagree:

1. The first obligation of an engineer is to fulfill an assignment from the employer, or a contract with a client.
2. When working in a foreign country, an American engineer should comply with local regulations and should avoid imposing more stringent American standards for safety.
3. Ethical considerations are an integral part of making engineering decisions.
4. A code of ethics can provide guidance in making engineering decisions.
5. Many ethical problems encountered by engineers have technical solutions.

In four sessions at two universities, we administered the five-item survey to 162 students before and after they watched the video. After the video, the students were more inclined to disagree with statements 1 and 2, and to agree with statements 3 and 5. According to the sign test and signed rank test, these changes in opinions were statistically significant ($p < 0.005$). These results confirmed our expectations. After watching the video, students would be less willing to agree with statement 1 when they realize that although engineers should complete assigned tasks, engineers have more important responsibilities to the public. Further, students would be less willing to agree with statement 2 and to apply more stringent American standards for

environmental safety.

The Defining Issues Test is based on the cognitive moral development theory of Kohlberg. On the current version of the Defining Issues Test, the DIT-2, the N2 score measures the sophistication of the subject's moral reasoning according to Kohlberg's stages: more precisely, N2 incorporates both the subject's preference for principled ("postconventional") moral reasoning and the subject's rejection of self-centered reasoning. At two universities, we administered the DIT-2 to 48 students one week before and one week after they watched the *Incident at Morales* video. According to the paired *t*-test, the increase in the N2 score from pre-test to post-test was statistically significant ($p < 0.0056$).

Because the DIT-2 is designed to measure changes in moral reasoning over long periods of time, we had expected little change in the N2 scores. Contrary to our expectations, a single viewing of the video can produce a significant increase in the level of moral reasoning, as measured by the N2 score. We cannot say whether the increase was caused by the video alone or by the combination of the video and the classroom discussion. We also do not know whether the increase is stable over the long term, and whether the effect sizes for men and women differ. Further research with larger numbers of students will be needed to answer these questions.

This study was supported by the National Science Foundation under Grant SES-0138309.

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[: Back to 2006 Summer Issue Vol. 2, No. 2](#)

[: Back to List of Issues](#)

[: Back to Table of Contents](#)