



## Open Research Online

---

The Open University's repository of research publications  
and other research outputs

# A Framework for teaching Ethics to ICS Students and Practitioners using Open Educational Resources

## Other

How to cite:

Ferreira, Giselle (2009). A Framework for teaching Ethics to ICS Students and Practitioners using Open Educational Resources. HEA Subject Centre for Information and Computer Sciences.

For guidance on citations see [FAQs](#).

© 2009 The Author

Version: Version of Record

Link(s) to article on publisher's website:

[http://www.ics.heacademy.ac.uk/projects/development-fund/fund\\_details.php?id=117](http://www.ics.heacademy.ac.uk/projects/development-fund/fund_details.php?id=117)

---

Copyright and Moral Rights for the articles on this site are retained by the individual authors and/or other copyright owners. For more information on Open Research Online's data [policy](#) on reuse of materials please consult the policies page.

---

[oro.open.ac.uk](http://oro.open.ac.uk)

# HIGHER EDUCATION ACADEMY SUBJECT NETWORK FOR INFORMATION AND COMPUTER SCIENCES

## DEVELOPMENT FUND OVERVIEW

### PROJECT

*A Framework for Teaching Ethics to ICS Students and Practitioners using Open Educational Resources*

### GRANTEE

Dr. Giselle M. d. S. Ferreira  
Department of Communication and Systems  
Faculty of Maths, Computing and Technology  
The Open University  
Walton Hall  
Milton Keynes  
MK7 6AA

### CONSULTANT

John Monk  
Emeritus Professor  
Department of Communication and Systems  
Faculty of Maths, Computing and Technology  
The Open University  
Walton Hall  
Milton Keynes  
MK7 6AA

### KEYWORDS

Ethics; professional practice; drama; rhetoric; emotions; ethical reasoning

### ABSTRACT

This project has exploited findings of a pilot study funded by The Open University's (OU) CETL known as COLMSCT (Centre for Open Learning of Maths, Science, Computing and Technology – <http://open.ac.uk/colmsct>) and carried out under the auspices of OpenLearn (<http://www.open.ac.uk/openlearn>), the OU's open content initiative. The project has used the experience gained in that study to create a multimedia self-study course introducing ethics in ICS to advanced students and practitioners. The course has been made openly and freely available as an OpenLearn unit that can be studied, re-used and re-purposed by the wider community involved in the area.

The license details regarding reuse of these materials are available at <http://creativecommons.org/licenses/by-nc-sa/2.0/uk/>, and the materials themselves can be accessed and downloaded at either of the following links: <http://openlearn.open.ac.uk/course/view.php?id=3990> (LearningSpace) and <http://labspace.open.ac.uk/course/view.php?id=5076> (LabSpace).

## **AIMS**

The project has achieved the following aims as originally proposed:

- 1) To re-purpose the materials created in a pilot project with a view to producing an OER to be made available on OpenLearn, taking into account the lessons learnt during the experience of running and evaluating the pilot
- 2) To provide colleagues and practitioners with an innovative framework for using dialogue in teaching and learning about ethics within the context of ICS
- 3) To enable further development of this framework and associated materials by other educators and, potentially, learners engaged in 'informal online learning' on OpenLearn

## **OUTCOMES**

The project has generated the following outcomes as originally proposed:

- 1) A self-contained study unit using dialogue and drama to teach about ethics within the context of ICS
- 2) Free dissemination of this study unit to learners and other educators via the OpenLearn's twin Web sites

The unit can be accessed and downloaded at either of the following links: <http://openlearn.open.ac.uk/course/view.php?id=3990> on the LearningSpace and <http://labspace.open.ac.uk/course/view.php?id=5076> on the LabSpace. Details of the license regarding reuse of these materials (Creative Commons Attribution-NonCommercial-ShareAlike) can be found online at <http://creativecommons.org/licenses/by-nc-sa/2.0/uk/>.

A further outcome has been a poster contribution to the 10<sup>th</sup> Annual Conference of the HEA Subject Centre for ICS: Ferreira, G. M. d. S. & Monk, J. (2009) 'Using drama to introduce ethics to technology students and practitioners'. The pdf file for this material is available at <http://kn.open.ac.uk/public/document.cfm?docid=12669>.

## **DELIVERABLES**

The project has delivered the following items:

- 1) A self-contained study unit that uses dialogue to teach about ethics within the context of ICS, published on both sites that constitute OpenLearn (<http://openlearn.open.ac.uk/course/view.php?id=3990> and <http://labspace.open.ac.uk/course/view.php?id=5076>).
- 2) Downloadable versions of the study unit under the same Creative Commons license and available via the links above: printable version of complete unit (HTML); XML using the OpenLearn schema; IMS Content Package; IMS Common Cartridge; Plain Zip; Moodle Backup

The availability of different versions of the same resources using different formats somewhat remedies potential interoperability issues, and the unit (complete or in parts) can be re-deployed on platforms different than Moodle with relative ease.

## BACKGROUND

With the support of a grant from the William and Flora Hewlett Foundation, OpenLearn has delivered, for free re-use within a Creative Commons license, not only a wealth of self-study learning resources that correspond to about 3% of the OU's current course provision, but effectively an integrated Virtual Learning Environment (VLE) encompassing a variety of communication and social networking tools available or attached to the open-source Moodle platform upon which the project web sites are built. OpenLearn extends the University's mission of offering open access to Higher Education within the government's agenda of widening participation, whilst providing the community of academics and educators worldwide a site for discussion, collaborative work and potential innovation in terms of curriculum, pedagogy and use of Web-based educational technologies. OpenLearn targets a wide audience via a pair of twin sites, the LearningSpace (<http://openlearn.open.ac.uk>), aimed primarily at learners, and the LabSpace (<http://labspace.open.ac.uk>), aimed primarily at other educators.

The project reported here capitalised on a pilot funded by the OU's CETL known as COLMSCT (Centre for Open Learning of Mathematics, Science, Computing and Technology – <http://open.ac.uk/colmsct>). The pilot revolved around a series of videoconferencing meetings organised and supported by Giselle Ferreira and convened by Prof. John Monk using FM (<http://fm-open.open.ac.uk>), a Web 2.0 tool made freely available through OpenLearn. The overall design of the learning experience involved supported group discussion around a selection of resources available as print, audio and video. Participants engaged with the recommended resources prior to joining the discussions, when they then contributed their own understandings and related them to practical examples, many drawn from their own everyday experience. A LabSpace study unit was created to provide a 'home' for the participant group with a structure that mirrored the structure proposed for the synchronous discussion; the unit contained most of the resources, a discussion forum to support asynchronous communication and relevant links, including links to the homepage of the FM sessions. The experience involved a series of 7 FM sessions, each with its own aims, with the last session in the series dedicated to general debriefing on the experience. Three preliminary familiarisation sessions took place prior to the main discussion, convened by a specialist in using FM. Further details on this trial are provided in Ferreira (2008), which explores the more institutional aspects of the work.

This project has exploited the feedback obtained in the aforementioned pilot to inform development of a self-study unit aimed at practitioners or advanced students. The unit is 'pitched' primarily at post-graduate level and should require an estimated 40-50 hours of reading time to be covered in its entirety. Two main dimensions of innovation have been explored:

- 1) Subject-specific: the use of dialogue and drama in learning and teaching ethics in technology provides a unique approach in that it affords a pedagogy based on bridging the gap between more 'academic' study of ethics and everyday conversation and decision-

making. Feedback gathered from participants in the pilot suggested that this bridge is particularly important in that it makes explicit the role of ethics in decision-making within professional practice, thus raising awareness of the importance of ethical reasoning and fostering self-reflection.

- 2) Use of multimedia and ICTs: The use of 'text' on different media (text, audio and video) proved especially successful in fostering debate and self-reflection amongst the pilot participants, and this element was retained in the unit delivered as much as copyrights restrictions permitted.

## **PUTTING IT INTO PRACTICE**

The following areas are highlighted for reflection by colleagues who may consider using or adapting the materials produced in this project:

- 1) Awareness of 'difference': the unit adopts the term 'final vocabularies' proposed by Richard Rorty to equip students with a means to frame their analysis of ethical statements and issues. In Rorty's words:

All human beings carry about a set of words which they employ to justify their actions, their beliefs, and their lives. These are the words in which we formulate praise of our friends and contempt for our enemies, our long-term projects, our deepest self-doubts and our highest hopes... I shall call these words a person's "final vocabulary". (Rorty, 1989, p. 73)

In unpicking statements in terms of the final vocabulary that supports them, students identify values, assumptions and beliefs, all of which underpin the types of ethical reasoning that takes place before decisions are made. This encourages student awareness of 'difference' as something that may often require great measure of negotiation and compromise to be overcome productively.

- 2) Use of conversation and discussion: Although the unit has been developed to constitute a resource for self-study, the core element of the conceptual framework upon which the resource is built, is, indeed, a view of 'dialogue as a medium for learning' (Monk & Ferreira, 2008). The unit includes relatively detailed analyses of a selection of texts that were, themselves, the outcome of dialogue carried out in the pilot project. However, it is hoped that, rather than constituting a static object, a 'final word by an expert', these analyses will be used within the context of further conversations and discussions that are likely to generate many further insights.

- 3) Use of different types of resources:

- (a) Codes of practice: the unit takes quite a unique approach to codes of practice, in contrast with uses of such texts in quite prescriptive ways. Instead, the unit uses codes of practice as objects worth of critical analysis and discussion themselves. These objects often contain profound internal contradictions, hence providing a rich source not only for the skilled dramatist but also for the professional engaged in reflective practice.

(b) Drama and literary sources: Although it is not always clearly recognised, it is in the everyday, routine conversations and dealings of people that ethical questions are refined, developed and, on occasion, answered. Accordingly, such dialogues influence action and guide conduct. Rather than focusing on the formulation of theory, a play or novel can demonstrate how ethical stances fare when placed alongside one another. This is when differences emerge and the importance of ethical deliberations and negotiation is highlighted. Also, such sources encourage the audience to empathise with characters, thus inviting the audience to examine their own ethical positions through their reactions to the dialogue, gesture and action set out in the script. In short, a suitable play or novel can function as an allegory representing issues and questions of relevance to an audience of practitioners in a variety of areas of technology development. The unit includes several examples of suitable texts and further examples are examined in Monk (2009).

(c) Media clips: the unit includes a few examples taken from the media including, in particular, newspaper items, suggesting the creation of a 'media file' as a tool to support student identification of ethical statements that, more often than not, underlie supposedly 'objective' reportage. The use of media clips and a 'media file' constitutes a potentially powerful tool to encourage students to develop awareness of ethical evaluation as something that is done routinely yet often tacitly. In part the strength is due to the possibility of grounding analysis and reflection in locations of current and, perhaps, direct relevance and interest to students.

## **ISSUES AND DEBATES**

Perhaps a major question that remains to be answered in this area concerns how to integrate teaching of 'ethics' in technology-based learning contexts in a *seamless* fashion. There is a wide variety of techniques and, more recently, open and free availability of resources created to support development in 'ethics' and/or 'professional issues', including innovations such as the use of story-telling, costumes, videos and props (Willis, 2009). However, opportunities to learn and develop in this area tend to be packaged separately from the main technical content, and this fragmentation, which mirrors the fragmentation between theory and practice, appears to contribute to limited perceptions of the role and importance of ethical reasoning in professional practice as well as everyday life.

There is, however, a significant difference between teaching 'ethics' and teaching about 'ethical issues', and this distinction is reflected in the focus and choice of materials used in the unit. The resource has not restricted an understanding of 'ethics' to that of a purely academic endeavour or an area of philosophy, and, indeed, some specialist terminology is introduced with the aim of providing learners with a shared vocabulary to help them frame their analysis and discussions. The unit adopts the view that, within an ICS (or, more generally, technology-related) learning situation, focus should lie on developing awareness of 'ethical issues' rather than adopt a 'knowledge transmission' pedagogical model predominantly focused on the prescriptive nature of codes of practice.

The unit includes numerous examples that clearly illustrate how technical and ethical reasoning are intertwined in professional practice. However, the material remains predominantly a separate object dissociated from what might be perceived by students as the 'main', 'essential' technical content of their chosen courses. Further integration is required. Therefore, the next step in developing these materials and taking forward the ideas upon which they are based is to imagine and trial new models, new ways of learning in the area that encourage students to develop non-fragmented views of what expertise and professional practice are, in essence.

## RESOURCES

### ***Primary resource and associated elements***

Ferreira, G. M. d. S. & Monk, J. (2009) *Introducing Ethics in Information and Computer Sciences*. Milton Keynes: The Open University. Available online at <http://openlearn.open.ac.uk/course/view.php?id=3990> and <http://labspace.open.ac.uk/course/view.php?id=5076> [Accessed 1 October 2009]

### ***Academic sources***

Austin, J (1986) *How to do things with words*. Edited by J. O Urmson and Marina Sbisa. New York: Oxford University Press

Giddens, A. (2006) *Sociology* (5<sup>th</sup> Edition). London: Polity.

Hume, D. (1986) *A Treatise of Human Nature*. Edited by Ernest C. Mossner, Penguin Classics, available online at the Project Gutenberg site, <http://www.gutenberg.org/etext/4705>

Janik, A. (1995) 'Rameau's nephew. Dialogue as Gesamtkunstwerk for enlightenment'. In *Skill, Technology and Enlightenment: On Practical Philosophy* (pp.57–74). London: Springer

Latour, B. (1999) *Pandora's Hope. Essays on the reality of science studies*. Cambridge, Massachusetts: Harvard University Press

Moore, G.E. (1903) *Principia Ethica*. Cambridge: Cambridge University Press. Complete text available online at <http://fair-use.org/g-e-moore/principia-ethica/>

Nussbaum, M. (1998) 'Emotions as judgments of value'. In *Comparative Criticism* v. 20 (pp. 33-62). Cambridge University Press.

Penhall, J. (2007) *Landscape with Weapon*. London: Methuen

Rorty, R. (1989) *Contingency, Irony and Solidarity*. Cambridge: Cambridge University Press.

Wittgenstein, L (1967). *Remarks on the Foundations of Mathematics*. Edited by G. H. von Wright, R. Rhees, G. E. M. Anscombe. Basil. Oxford: Basil Blackwell

Wittgenstein, L (1992, 3<sup>rd</sup> edition) *Philosophical Investigations*. Translated by G. E. M. Ascombe. Oxford: Blackwell

### **Professional sources**

Engineering Council UK (n.d.) *Statement of Ethical Principles*. Available online at [http://www.engc.org.uk/documents/Statement of Ethical Principles.pdf](http://www.engc.org.uk/documents/Statement_of_Ethical_Principles.pdf)

Institution of Engineering and Technology (IET) (2007) *Rules of Conduct*. Available online at <http://www.theiet.org/about/governance/rules-conduct/>

IEEE (2003, August, last modified) *Code of Conduct*. Available online at [http://standards.ieee.org/resources/development/wg\\_dev/code\\_conduct.html](http://standards.ieee.org/resources/development/wg_dev/code_conduct.html)

### **Literary sources**

Frayn, M. (1965) *The Tin Men*. London: Faber and Faber

Hare, D. (2005) *The Permanent Way*. London: Faber

Hims, K (2006) *Call Waiting*. Producer S. Davies, BBC Radio 4. Broadcast 9 May 2006

Harrison, H. & Minsky, M. (1992) *The Turing Option*. London: Penguin

Miller, A. (1947) (2001) *All my sons*. London: Penguin

Plato (n.d.) *Gorgias*. Translation available on the Perseus Digital Library, online at [http://www.perseus.tufts.edu/cache/perscoll\\_Greco-Roman.html](http://www.perseus.tufts.edu/cache/perscoll_Greco-Roman.html)

Plato (n.d.) *Meno*. Translation available on the Perseus Digital Library, online at [http://www.perseus.tufts.edu/cache/perscoll\\_Greco-Roman.html](http://www.perseus.tufts.edu/cache/perscoll_Greco-Roman.html)

Plato (n.d.) *Protagoras*. Translation available on the Perseus Digital Library, online at [http://www.perseus.tufts.edu/cache/perscoll\\_Greco-Roman.html](http://www.perseus.tufts.edu/cache/perscoll_Greco-Roman.html)

Shaw, G. B. (1907) *Major Barbara*. Synopsis available online at [http://en.wikipedia.org/wiki/Major\\_Barbara\\_\(play\)](http://en.wikipedia.org/wiki/Major_Barbara_(play)); complete script available online at <http://www.gutenberg.org/etext/3790>

Sophocles (n.d.) *Antigone*. Synopsis available online at [http://en.wikipedia.org/wiki/Antigone\\_\(play\)](http://en.wikipedia.org/wiki/Antigone_(play)); complete text available at <http://www.gutenberg.org/files/31/31-h/31-h.htm>

Walker, M. (2006) *Last Call*. Producer M. Ward-Lowery, BBC Radio 4. Broadcast 10 May 2006

### **Audio-visual**

Monk, J. (2007) *Information: Ethics*. Video available online at <http://www.youtube.com/watch?v=reusFp-JzW0> [Accessed 31 July 2009]

### **Books**



Baase, S. & Arnold, D. (2003) *A Gift of Fire: Social, Legal and Ethical Issues for Computer and the Internet (International Edition)*. Upper Saddle River: Prentice Hall.

Bott, F. (2005) *Professional Issues in Information Technology*. Swindon: The British Computer Society.

Bynum, T. W. & Rogerson, S. (eds.) (2003) *Computer Ethics and Professional Responsibility: Introductory Text and Readings*. London: Blackwell Publishing.

De George, R. T. (1999) *Business Ethics* (5<sup>th</sup> ed.). Upper Saddle River, New Jersey: Prentice Hall.

Ermann, M. D. & Shauf, M. S. (eds.) (2003) *Computers, Ethics, and Society*. New York; Oxford: Oxford University Press.

Frey, R. G. & Wellman, C. H. (2005) *A Companion to Applied Ethics*. Oxford: Blackwell Publishing.

Himma, K. E. & Tavani, H. T. (eds.) (2008) *Handbook of Information and Computer Ethics*. London: Wiley/Blackwell

Johnson, D. G. (2003) *Computer Ethics*. Upper Saddle River: Prentice Hall.

Singer, P. (1993) *A Companion to Ethics*. Oxford: Blackwell Publishing.

Sollie, P. & Düwell, M. (eds.) (2009) *Evaluating New Technologies*.

Spinello, R. (2004) *Readings in Cyberethics*. Sudbury, MA: Jones and Bartlett Publishers International.

Spinello, R. (2006) (3<sup>rd</sup> edition) *Cyberethics: Morality and Law in Cyberspace*. Sudbury, MA: Jones and Bartlett Publishers International.

Spinello, R. (2002) *Case Studies in Information Technology Ethics*. Upper Saddle River: Prentice Hall.

Spinello, R. & Tavani, H. T. (eds.) (2001) *Readings in Computer Ethics*. Sudbury, MA: Jones and Bartlett Publishers International.

[Forthcoming publication worth examining: Floridi, L. *The Cambridge Handbook of Information and Computer Ethics*. To be published by Cambridge University Press in April 2010]

### **Web-based resources**

Epstein, R. G. (2006) 'Case of the Killer Robot'. Available at the Online Ethics Center for Engineering, National Academy of Engineering., <http://www.onlineethics.org/CMS/computers/compcases/killerrobot.aspx>. [Accessed 18 July 2009]

Gooday, G. (n.d.) 'The Importance of Learning Skills of Critical and Independent Thinking in a Computer Ethics Course'. Discussion paper available online at

[http://www.ics.heacademy.ac.uk/events/presentations/446\\_gg.doc](http://www.ics.heacademy.ac.uk/events/presentations/446_gg.doc) [Accessed 18 July 2009]

### **Professional Institutions**

British Computer Society (BCS) <http://www.bcs.org>

BCS Ethics Forum

<http://www.bcs.org/server.php?show=nav.8618>

BCS Code of Conduct <http://www.bcs.org/server.php?show=nav.6030>

BCS Code of Good Practice  
<http://www.bcs.org/server.php?show=conWebDoc.1589>

Engineering Council UK <http://www.engc.org.uk/>

The Royal Academy of Engineering <http://www.raeng.org.uk/>

*Statement of Ethical Principles*

[http://www.raeng.org.uk/societygov/engineeringethics/pdf/Statement\\_of\\_Ethical\\_Principles.pdf](http://www.raeng.org.uk/societygov/engineeringethics/pdf/Statement_of_Ethical_Principles.pdf)

*An Engineering Ethics Curriculum Map*

[http://www.raeng.org.uk/news/releases/pdf/Ethics\\_Curriculum\\_Map.pdf](http://www.raeng.org.uk/news/releases/pdf/Ethics_Curriculum_Map.pdf)

### **Sources for Research and Teaching**

ACM SIG Computers and Society <http://www.sigcas.org/>

Centre for Computing and Social Responsibility (CCRS), De Montfort University <http://www.ccsr.cse.dmu.ac.uk/index.html>

Information and Computer Sciences Subject Network, Higher Education Academy <http://www.ics.heacademy.ac.uk/>

Information Ethics Inc. <http://www.info-ethics.com/>

Interdisciplinary Ethics Applied CETL, University of Leeds  
<http://www.idea.leeds.ac.uk/>

Online Ethics Center at the National Academy of Engineering  
<http://www.onlineethics.org/>

Stanford Encyclopaedia of Philosophy. 'Computer and Information Ethics'  
<http://plato.stanford.edu/entries/ethics-computer>

The Research Centre on Computing and Society, Southern Connecticut State University  
<http://www.southernct.edu/organizations/rccs/index.html>

Richard Epstein's Resources <http://www.cs.wcupa.edu/~epstein/>

### **Journals**

ACM Transactions on Information Systems <http://tois.acm.org/>

Behaviour and Information Technology  
<http://www.tandf.co.uk/journals/tf/0144929X.html>

British Journal of Sociology <http://www2.lse.ac.uk/BJS/Home.aspx>

Communications of the ACM <http://cacm.acm.org/>

European Journal of Information Systems <http://www.palgrave-journals.com/ejis/index.html>

*ETHICOMP Journal* <http://www.ccsr.cse.dmu.ac.uk/journal/>

*Information Systems Frontiers*  
<http://www.som.buffalo.edu/isinterface/ISFrontiers/>

*Interacting with Computers*  
[http://www.elsevier.com/wps/find/journaldescription.cws\\_home/525445/description#description](http://www.elsevier.com/wps/find/journaldescription.cws_home/525445/description#description)

*International Journal of Human-Computer Studies*  
[http://www.elsevier.com/wps/find/journaldescription.cws\\_home/622846/description#description](http://www.elsevier.com/wps/find/journaldescription.cws_home/622846/description#description)

*Journal of Information Technology* <http://www.palgrave-journals.com/jit/index.html>

*Journal of the American Society for Information Science and Technology*  
<http://eu.wiley.com/WileyCDA/WileyTitle/productCd-ASI.html>

*Journal of Professional Issues in Engineering Education and Practice*  
<http://scitation.aip.org/epo/>

*Metaphilosophy* <http://www.wiley.com/bw/journal.asp?ref=0026-1068>

*Journal of Professional Issues in Engineering Education and Practice*  
<http://scitation.aip.org/epo/>

*Science and Engineering Ethics*  
<http://www.springer.com/philosophy/ethics/journal/11948>

*Science, Technology and Human Values* <http://sth.sagepub.com/>

*Social Studies of Science* <http://sss.sagepub.com/>

*Technology and Culture* <http://etc.technologyandculture.net/>

*Technology in Society*  
[http://www.elsevier.com/wps/find/journaldescription.cws\\_home/384/description#description](http://www.elsevier.com/wps/find/journaldescription.cws_home/384/description#description)

*Technovation*  
[http://www.elsevier.com/wps/find/journaldescription.cws\\_home/422925/description#description](http://www.elsevier.com/wps/find/journaldescription.cws_home/422925/description#description)

*The IMIS Column on Computer Ethics*  
<http://www.ccsr.cse.dmu.ac.uk/resources/general/ethicol.html>

*The Information Society* <http://www.indiana.edu/~tisj/>

## **Media**

*Guardian Technology* <http://www.guardian.co.uk/technology>

*Information Week* <http://www.informationweek.com>

*The Register* <http://www.theregister.co.uk/>

*Wired* <http://www.wired.com>

## BIBLIOGRAPHY

Ferreira, G. M. d. S. (2008) 'On the impact of Open Educational Resources: two case-studies'. Working paper available online at <http://kn.open.ac.uk/public/document.cfm?docid=11600> [Accessed 29 July 2009]

Ferreira, G. M. d. S. (2009) *Communicating, learning and the in-between: a study on the impact of open-access, informal online learning environments*. COLMSCT Project Report. Milton Keynes: The Open University. Available online at <http://kn.open.ac.uk/public/document.cfm?docid=12670> [Accessed 29 July 2009]

Gooday, G. (n.d.) 'The Importance of Learning Skills of Critical and Independent Thinking in a Computer Ethics Course'. Discussion paper available online at [http://www.ics.heacademy.ac.uk/events/presentations/446\\_gg.doc](http://www.ics.heacademy.ac.uk/events/presentations/446_gg.doc) [Accessed 18 July 2009]

Monk, J. (2008) 'Emotion, Engineering and Ethics'. In *Proceedings of the 2008 Workshop on Philosophy and engineering WPE-2008*, 10-12 November 2008, The Royal Academy of Engineering, London. Available online at <http://philengtech.org/wp-content/uploads/2009/08/wpe-2008-abstract-papers.pdf> [Accessed 29 July 2009]

Monk, J. (2009) 'Ethics, Engineers and Drama'. *Science and Engineering Ethics* v. 15 n.1 pp. 111–123

Monk, J. & Ferreira G. M. d. S. 'Resources for an experimental course in ethics'. In *Proceedings of the 2008 Workshop on Philosophy and engineering WPE-2008*, 10-12 November 2008, The Royal Academy of Engineering, London. Available online at <http://philengtech.org/wp-content/uploads/2009/08/wpe-2008-abstract-papers.pdf> [Accessed 29 July 2009]

Rorty, R. (1989) *Contingency, Irony and Solidarity*. Cambridge: Cambridge University Press.

Willis, L. (2009) 'Using story telling, drama, costume, poetry, music and performance art as part of engineering lectures'. Case-study based on the work of Mike Clifford (Mechanical Engineering, The University of Nottingham). The Higher Education Academy Engineering Subject Centre. Available online at <http://www.engsc.ac.uk/downloads/case-study-nottingham.pdf>