

Educational software reflecting two philosophical approaches to ethics education

Marieke Hettinga* and Betty Collis**

** Now at Department of Social Studies, Noordelijke Hogeschool Leeuwarden, Postbus 1018, 8900 CA Leeuwarden. The paper refers to work done prior to taking the appointment at the Noordelijke Hogeschool Leeuwarden.¹*

*** Faculty of Educational Science and Technology, University of Twente, Postbus 217, 7500 AE Enschede; email: collis@edte.utwente.nl.*

Abstract

Ethics education can vary considerably in its instructional strategies based on differences in the theoretical positions underlying the approach to moral development being stressed. Two such approaches are the 'justice' approach as exemplified by Kohlberg's six stages of moral development, and the 'care ethic' approach as exemplified by Gilligan's work on empathy as a base for moral decision-making. Each of these approaches can be demonstrated through different instructional strategies in the ethics education course, but each strategy is often difficult to execute in practice, given time and resource constraints.

Introduction

Problems in the delivery of ethics education

Ethics education in university is not a field in which one can easily imagine extensive use of educational software. There are, for instance, no drill-and-practice programs in ethics education because there are no unambiguous answers to ethical problems. That is what ethics is all about: complex moral dilemmas without single solutions. Ethics courses usually offer theories from great philosophers about how to deal with moral dilemmas. And usually they offer students a chance to deal with a dilemma themselves.

It is in this second part of ethics education where didactic difficulties often arise. In order to deal with a dilemma, the students need to be able to discuss this dilemma with fellow students. Therefore, a class oriented toward such discussion should not consist of more than a small number of students, perhaps 20. This limit is in many higher-education settings exceeded with the consequence that only a small number of students get a chance to speak up. Cost cutbacks restrict the number of tutor-led seminar groups that can be formed out of large lecture groups.

Another difficulty arises in the experience of a real dilemma. When does a dilemma offer a real-life experience? Can a description of a case in a few lines be called a real dilemma? In other words: what is needed to get the empathy and engagement of a student in a complex case?

Two projects involving educational software for ethics education

There appear to be useful possibilities for educational software in the context of these two difficulties. One application of educational software could be to provide a substitute for the dialogue aspects of face-to-face small-group discussions, and a second application is to create an electronic learning environment in which students are able to experience a real-life moral dilemma from a variety of perspectives and with a number of sensory modalities.

In this paper, we will describe two projects for ethics education in which we have been involved, and which were concerned with the design, development, and evaluation of educational software for the two types of applications described above. The first is the COLADA project of the Educational Centre at the University of Twente in The Netherlands (de Mink, 1991). In this project, software is created which offers students the opportunity to participate in a heated discussion with electronic partners about a described case involving an ethical dilemma. The second project is called the THEORIA project (Watkins, 1992). It is being carried out by the Center for the Advancement of Applied Ethics at the Carnegie Mellon University in Pittsburgh, Pennsylvania, USA. The emphasis in the software of the THEORIA project is not on discussion or rational arguments, but on being able to offer students a close-to-real-life experience of a case involving a complex ethical dilemma.

The conceptual backgrounds of these two projects seem to be contradictory: COLADA stresses rational discussion, while THEORIA emphasizes an increase in students' sensitivity and empathy. However, in ethics education both approaches are necessary. Therefore, each project addresses a different difficulty in the delivery of ethics education in the higher-education setting.

In this paper, we will describe the conceptual background as well as examples of the software developed in the two projects, and give an evaluation of the software from different perspectives of educational effectiveness. Furthermore, we will raise the question of combining both conceptual orientations in one electronic learning resource. This could be an efficient way to deal with the two difficulties – compensating for lack of opportunity for intensive face-to-face discussions, and inadequate exposure to the complexity of an ethical dilemma – in the delivery of ethics education that were noted above.

The COLADA project

Kohlberg and the six stages of moral development

The theoretical background of the COLADA project at the University of Twente in The Netherlands lies in the philosophical position called the 'ethics of justice' or of reason. A central person associated with this approach is Lawrence Kohlberg (1981). His theory is

built around the concept of a fixed and universal sequence of moral development. According to Kohlberg, this moral development can be divided into six stages. Every person passes through a number of these stages. However, their rate of velocity of evolution may differ and so also their final stage of development. Some people reach the highest stage while others do not get any further than, for instance, stage 3. Kohlberg's six stages are briefly indicated in Table 1.

Table 1: Kohlberg's six stages

Stage	Description
Stage 1	Right is literal obedience to rules and authority (parents), avoiding punishment, and not doing physical harm.
Stage 2	Right is serving one's own or other's needs and making fair deals in terms of concrete exchange: 'You scratch my back and I'll scratch yours'.
Stage 3	The right is playing a good (nice) role, being concerned about other people and their feelings, keeping loyalty and trust with partners, and being motivated to follow rules and expectations.
Stage 4	The right is doing one's duty in society, upholding the social order, and maintaining the welfare of society or the group.
Stage 5	The right is upholding the basic rights, values, and legal contracts of society, even when they conflict with the concrete rules and laws of the group.
Stage 6	This stage assumes guidance by universal ethical principles that all humanity should follow. Principles are universal principles of justice: the equality of human rights and respect for the dignity of human beings as individuals.

Kohlberg, 1981, pp. 409–12.

How did Kohlberg come to the definition of these stages? The stages reflect a division of the kind of arguments people use when confronted with a moral dilemma. Kohlberg did research in many different contexts and cultures, and concluded that there were six different and sequentially more adequate ways of dealing with an ethical dilemma (Kohlberg, 1981). The six stages can be placed in a hierarchical order. Each stage reflects a higher degree of abstraction and is more widely applicable than the former; thus according to Kohlberg, each stage is ethically more adequate than those that have preceded it.

The arguments used in Kohlberg's highest stage are based on what are defined as the principles of justice: the equality of human rights and respect for the dignity of human beings as individuals (Kohlberg, 1981). These principles are universal. They can be rationally derived and argued. Sensitivity and emotion should not play a role in moral decision-making, since such feelings can differ from person to person, and may be unable to rise above the specifics of a certain situation. So, according to Kohlberg's approach to ethical development, feelings and emotions will never lead to universal ethical principles. Universalization is the central issue in the highest stage. A guideline here is the Golden Rule: do unto others as you would have them do unto you.

Ethics education reflecting Kohlberg

Based on this theory, Kohlberg developed an educational method which he called interactive progressivism (Kohlberg, 1981). The essence of this method is that the individual's progress through the different stages of moral development needs to be stimulated. Since this development follows a natural sequence, ethics education should be free of indoctrination. Moral development can be stimulated through interaction between the student and the environment. The student should actively deal with moral situations. This can be done by confronting the student with a dilemma for which he or she does not have an immediate solution. Thus his or her present stage of development is not adequate. Next, the students should be confronted with arguments from a higher stage than their current level. The students will experience that these arguments are more adequate to deal with the problem than are arguments of a lower stage. Intense discussion with a skilled mentor is a good means for confronting students with arguments from a higher stage.

Educational software reflecting Kohlberg's philosophy of ethical development

The COLADA shell for software to engage the student in dialogue about an ethical dilemma

The COLADA project being carried out at the Educational Centre at the University of Twente is based on the philosophy of justice and on Kohlberg's conception of a fixed sequence of stages of moral development. The Centre has been contracted to develop educational software for ethics education based on the educational method of Kohlberg

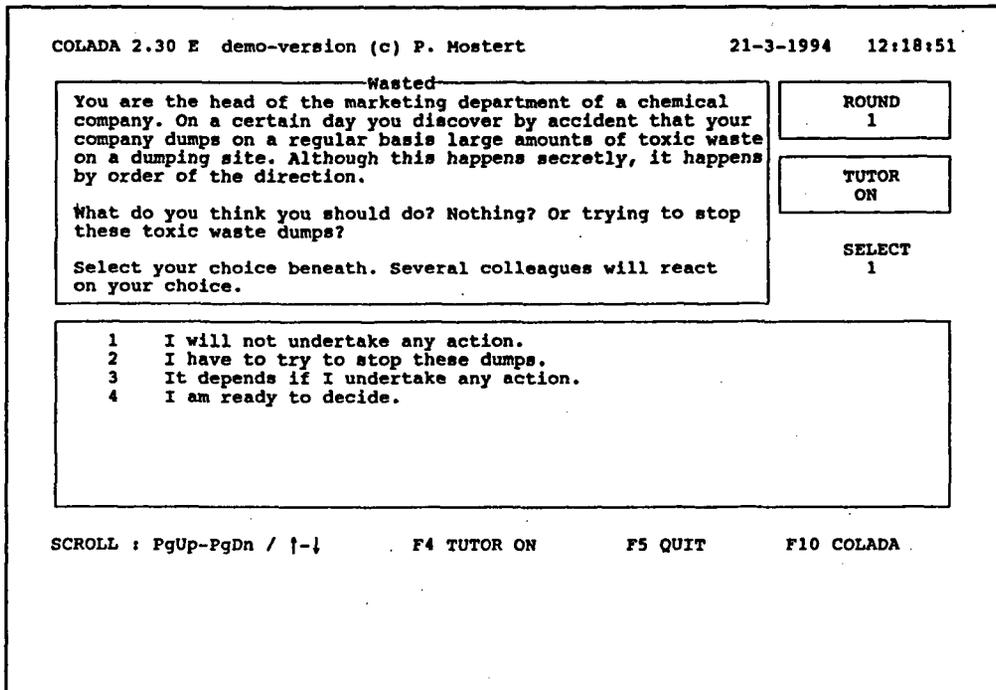


Figure 1: The structure of COLADA

COLADA 2.30 E demo-version (c) P. Mostert 21-3-1994 12:19:55

~~Wasted~~

You are the head of the marketing department of a chemical company. On a certain day you discover by accident that your company dumps on a regular basis large amounts of toxic waste on a dumping site. Although this happens secretly, it happens by order of the direction.

What do you think you should do? Nothing? Or trying to stop these dumps?

Select your choice beneath. Several colleagues will react on

ROUND 2

TUTOR ON

SELECT 1

~~COMPUTER~~

Not any action? You are the witness of a crime which has far-reaching consequences for the environment!

~~TUTOR~~

You have to deal with a passionately reacting colleague who obviously condemns you for undertaking no action.

1

2

3

4

SCROLL : PgUp-PgDn / ↑-↓ READY : SPACEBAR

Figure 2: The discussion within COLADA

COLADA 2.30 E demo-version (c) P. Mostert 21-3-1994 12:20:24

~~Wasted~~

You are the head of the marketing department of a chemical company. On a certain day you discover by accident that your company dumps on a regular basis large amounts of toxic waste on a dumping site. Although this happens secretly, it happens by order of the direction.

What do you think you should do? Nothing? Or trying to stop these dumps?

Select your choice beneath. Several colleagues will react on

ROUND 3

TUTOR ON

SELECT 6

~~YOUR DECISION~~

In my opinion...

1

2

3 As the responsible person for the marketing policy I think I should tell the direction about this problem.

4 I should do everything in my power to prevent damage on the environment.

5 I would not undertake any action if it concerns just a small amount of waste.

6 I am ready to decide.

SCROLL : PgUp-PgDn F1 CANCEL F5 QUIT

Figure 3: The final decision

and reflecting the problem of inadequate opportunities for students to engage in face-to-face intensive discussions with a skilled mentor, given increasing class sizes and fixed staff resources. The software is being produced through the use of a relatively simple authoring package, also called COLADA 2. This package provides a shell into which a brief textual description of an ethical dilemma can be entered, and response options reflecting different stages of moral development can be offered to the respondent. Following each choice of response by the student, a new set of options and associated 'discussion' can be offered by the software. This means that within a preset didactical structure, the contents can be varied to reflect as many different ethical dilemmas as the instructor wishes the students to consider. The following description shows the general structure of the COLADA program, through one of the cases developed by the first author of this paper.

An example of an ethical dilemma presented by COLADA

The student is shown a case containing a moral dilemma, in this example a dilemma concerning secretly dumped chemical waste (Figure 1).

The students are asked to imagine that they are one of the central figures in this dilemma, and that they will have to make an ethical decision in the case. The students can choose one of a number of response possibilities. Next, another 'person' from the case will react to the response choice of the students (Figure 2).

This process, involving pre-programmed branching options, can be continued a number of times. If the students wish, they can also ask for a reaction from the 'tutor'. The tutor's reactions have been entered by the instructor previously, and give, for instance, an explanation about the arguments that were used, or give a theoretical perspective. When these reactions are removed from the screen, the students can engage in further discussion by reacting to the comments made by the 'discussion partner' in the program. They are able to do this by choosing from a new number of pre-programmed, multiple-choice possibilities. Whenever the students want to stop the discussion, they choose the option *Ready to decide . . .* A new box will appear in which the students will type a description of their final decision (Figure 3). After this, the students are shown an explanation of the case. If they want to, they can print their decision and the explanation.

Evaluating the use of the COLADA program

The first author of this paper participated in, or carried out in full, various evaluations of different cases entered into the COLADA shell. One evaluation focused on the educational design of the software itself, and another on student reactions to the program as a learning experience in ethics education. In addition, another evaluation focusing on the effectiveness of the program on advancing students' levels of moral development was also being carried out, and its preliminary results were made available to the authors.

Educational design aspects of the program

We studied programs generated by the COLADA shell according to various features relating to usability (Nielsen, 1993), user-interface design (Shneiderman, 1987), and instructional design (Alessi and Trollip, 1985). These perspectives related to flexibility and adaptability, user-friendliness, feedback adequacy, and instructional-design choices.

The evaluation is described in detail elsewhere (Hettinga, 1993a,b); some of its major conclusions follow.

- The flexibility of the program is good. The contents can be varied in many ways in that the instructor can in theory enter as many different cases as he or she wishes.
- However, this content flexibility does not automatically imply that the instructional flexibility of the program is also good. The content may be flexible, but it must be entered according to a very complicated and inflexible structure. Instructors who want to adapt the program to cases relevant to their specific situation will not have many technical problems, but they might find the requirements of the structure itself too complicated to realize. Partly, this is because of the considerable time needed to think through many different response options, each apparently representing different stages of moral development, and to express each option in parallel form in a string whose length can have only limited variability.
- From the learner's perspective, a number of aspects of the program were not user-friendly. It is not always clear how one should go on in the program and the Help function needed considerable improvement. However, these points could be changed within the shell program itself, with some effort.
- The feedback options offered by the COLADA shell are good. The 'discussion partner' reacts first, and second (if it is requested) the 'tutor' reacts. This structure gives the possibility of dividing the reactions offered by the program into concrete case-based reactions (given by the 'discussion partner') and abstraction reactions (given by the 'tutor'). The 'tutor' could for instance refer the student to relevant literature. All of this potential, however, depends on the skill of the instructor in entering appropriate dialogue into the shell, a process (as noted above) that is time-consuming and conceptually challenging.
- The layouts of the screens are functional, but of limited visual appeal. The screen is divided into a few boxes, each with a pre-determined content. This gives clarity to the students. There is, however, one box which could be emphasized more. This is the box at the bottom of the screen containing the possible command options. In its current presentation, the box could be overlooked (see Figures 1, 2 and 3).

Student evaluation of the program

As a second approach to evaluation, we asked a sample of six students from the Faculty of Business Studies at the University of Twente to work with a case entered in the COLADA shell involving the production of a malfunctioning and therefore dangerous laser drill. After discussing this case in the COLADA shell, they participated in an interview about their reactions to the use of the program as a learning experience. We also asked the students to indicate if they thought they had learned something from the experience. A summary of the student reactions follows; as before, a detailed review of this aspect of the evaluation is available in Hettinga, 1993a,b.

- The students thought they had strengthened their ability to discuss ethical problems and to find convincing arguments through the experience of interacting with the program. Besides that, the students said that the experience of the detailed dialogue offered by the program gave them a better idea about what ethical dilemmas really are and how they can be seen from different levels of development. Finally, the

students indicated that they thought they had learned an approach to rational discussion which they could use in the future.

Effectiveness evaluation

An additional evaluation was also carried out that looked more specifically at the effects of the program relative to students progressing to a higher level of Kohlberg's moral development. This evaluation was carried out by the developer of the program. In this study, students worked about one and a half hours with the program. A few weeks before and a few weeks after this session, they gave a written reaction to the same case. The arguments of the students were analysed, and each placed in one of the six stages of Kohlberg. This classification of arguments made it possible to compare the arguments the students used before their experience of the program and the arguments they used after working with the program. This comparison showed that indeed a number of students did move to a higher stage of moral development in their decisions, although the change was not statistically significant ($p > 0.5$, de Mink, 1991). A careful conclusion from this evaluation, which is still in progress, is that working with the program may have a positive effect on the students' ability to reason about moral dilemmas.

The THEORIA project

Theoretical framework for the THEORIA project: the care ethic

The THEORIA project at the Center for the Advancement of Applied Ethics at Carnegie Mellon University has a different theoretical background from the COLADA project. The central theme in the philosophical approach underlying the THEORIA project is that of care for the other person (Covey, 1993). The needs of the specific person in the specific moral situation is the central issue: universalization is not a goal and should even be avoided. Instead of universal and abstract rules and values, the details of a case are of critical importance.

A central person in this theoretical approach is Carol Gilligan (1982). She claims that Kohlberg looks at moral conflict too much from the viewpoint of rights. A moral conflict is in his eyes a conflict between rights. Resolving the problem is a matter of bringing up arguments in favour of one person's rights compared to those of another. Gilligan defines a moral problem, however, as a conflict of responsibilities involving the well-being of people (Gilligan, 1982). Resolving the problem is not just the weighing of rights. One needs to know the case thoroughly to decide which responsibility should be given priority above another in a particular context. To get to know the case thoroughly, one should gather as much detail about it as possible. Following this, sensitivity to the particular context is needed. One needs to be open to the details, feelings, and emotions of those involved with regard to the situation.

Ethics education reflecting the care ethic

Ethics education based on this theoretical viewpoint should teach students how to empathize in cases which show a moral dilemma. Students should be taught to be sensitive to the details and emotions involved in a case. A requirement for ethics education according to this method is, first of all cases, which offer the details and

emotions of a complex moral dilemma: cases with 'thick descriptions' (Rorty, 1989). A second requirement is that students should be taught how to deal with all the details and emotions from a case when confronted with these thick descriptions.

Vivid and thick descriptions of cases may not spontaneously bring up the possibilities of a computer as a learning resource, particularly if one's experience with educational software has been with structured and choice-restricted shells such as COLADA. However, modern multimedia software certainly makes thick descriptions and, as a presented consequence, empathy possible. Within the THEORIA project various programs have been designed and developed with these premises. We were involved with two of them, one during an evaluation of use in practice, and for the other, as a designer and developer. We will describe here the one in which we were involved in an evaluation: 'A right to die? The case of Dax Cowart'.

'A right to die?': multimedia software for ethics education

This program contains textual information as well as audio-visual material about the true case of a man named Dax Cowart (User Manual, 1990). In 1973, Donald (Dax) Cowart suffered burns over 65 per cent of his body, and was left blind and maimed when his car, parked over a leaking gas line, exploded. For 17 months, as he underwent agonizing burn therapy, he pleaded with doctors and nurses to stop the treatments and let him die. Actual visual footage was taken of the Dax Cowart case, including interviews with the victim, his family, and his medical attendants. This video footage has been worked into the multimedia learning program.

The program starts with a main menu (Figure 4) from which all the sections of the program can be accessed.

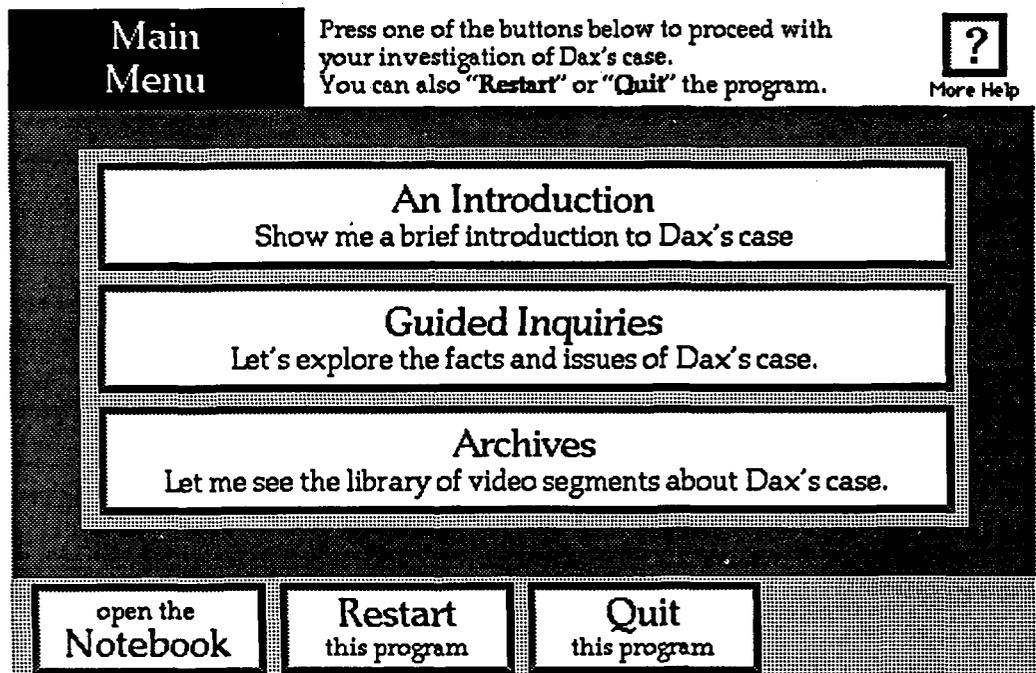


Figure 4: The Dax case – Main Menu

Issues Menu

Press the buttons below to begin exploring the issues of Dax's case. Then press "Return to inquiries menu" to register your final position on Dax's case.

?
More Help

Medical Professionals' Obligations
Thoughts of Dax's health care providers about the case.

Pain of Treatment
Issues about the painful nature of Dax's treatment.

Quality of Life Issues
Thoughts of Dax's quality of life before and after the accident.

Patient's Rights and Capacities
Issues surrounding Dax's rights and ability to administer them.

open the **Notebook** **Return** to inquiries menu **Quit** this program

Figure 5: The issue of the audio-visual material

Archives Menu

Press a button below to see that section of the archives. When you finish this section, you can "Return to main menu" or "Quit this program."

?
More Help

The Case
take a look at the facts surrounding Dax's case.

The Principals
see videos organized by the principal people of the case.

The Issues
see the video library organized by the issues of the case.

open the **Notebook** **Return to** the main menu **Restart** this program **Quit** this program

Figure 6: The Archives Menu of self-directed exploration

By selecting An Introduction, a visual montage of Dax Cowart before and after his accident, and a narrative summary of the case, are presented. In addition, the introduction poses the task: to come to a reasoned position on whether Dax Cowart should be released from treatment to return home, in all likelihood to die, as he requests.

The Guided Inquiries option leads the user through the narrative and audio-visual material. The guided tour starts with a review of the facts of the case and asks the user for an initial position. Second, the videos are shown. They are arranged by issue (Figure 5).

After each video fragment the opportunity is given to reflect on what one has seen, and to affirm or revise the preliminary judgement on whether Dax should gain his release. These reflections help the student deal with the complexity of the case. After these video fragments, the student is asked to give a final position. When this position is registered, a final video segment is presented for the student to ponder. After this, the student is returned automatically to the main menu.

The third option of the main menu is called the Archives (Figure 6). This section allows one to move independently through the case narrative and all audio-visual material. In the Archives, the user is not prompted for a position. The audio-visual materials are organized around the issues and principal characters of the case. The purpose of the Archives is to provide the means to carry out self-directed exploration of the facts and the issues of the case.

Evaluation of 'A right to die?'

'A right to die?' was also evaluated by us on its educational aspects (Hettinga, 1993b,c). The following are the main findings of the evaluation.

- The program was very user-friendly, partly thanks to the design of its graphical user interface.
- An important aspect of a large hypermedia program such as this one, is the support offered for navigation through the program (Reeves and Harmon, 1993). A user for instance needs to know where in the program he or she is. This has been done well in 'A right to die?'. Besides that, the program offers the possibility of a guided tour.
- However, another option, important for a large program (Reeves and Harmon, 1993), is not offered by 'A right to die?'. This function is called mapping. Through a graphical representation of the program – a map – the user can see where he or she is, and where he or she has been before. Mapping would be a positive addition to 'A right to die?', since the program is large and therefore a user may lose orientation.
- Another aspect we evaluated was the screen layout. The screen design is quite good in 'A right to die?'. Its layout is clearly and functionally structured, and it follows a consistent plan throughout.

Based on this evaluation, we concluded that the educational-design aspects of the program are good.

In addition, an extensive summative evaluation of the program has been done by an instructional technologist (CAAE, 1992). He compared three treatments of the case: with interactive video, linear video, and with text only. At the time of writing, all the data has

been gathered but the analysis has not yet been completed. The data was collected via questionnaires responded to by students in courses at Carnegie Mellon where the software is being used. The questionnaire, in addition to items relating to personal information about the respondents, included a Defining Issues Test (a standardized test of moral development), pre- and post-tests, videotaped think-aloud protocols, log files and delayed interviews.

Using the personal information and the pre- and post-tests, one aspect of the evaluation has been analysed completely: the students' change of attitude regarding the question: 'Should Dax be granted his request to die?' The students' attitudes indeed did change significantly. It appears, however, that there was no significant change due to the three different treatments. The attitude changes might indicate that the students were better able to empathize in the case after instruction than they had been before instruction. This conclusion was supported by the interviews held with students. The students realized that the case was much more complicated than they had thought in advance. They were touched by the details and emotions of the dilemma.

Conclusion: can we combine philosophical approaches in one software product?

The description of these projects shows how valuable both kinds of educational software can be for ethics education. The COLADA programs teach students how to reason about moral dilemmas, and to approach these dilemmas as abstractly as possible. The THEORIA programs, on the other hand, teach students to empathize in a case. Students should be sensitive towards the details and emotions of a specific case. The approaches seem contradictory. We think, however, that both ways of dealing with a moral problem are necessary, both in private as well as in professional life. They are complementary. Students should therefore be taught both approaches. Preferably, they should be shown how to use both approaches on one and the same case.

How can both approaches be integrated in one program? As a starting point in answer to this question, take 'A right to die?'. Abstract discussions are not included in this program. How could they be added to the content? A new section should be created in which the topic can be released from the specific context and discussed in abstract terms. We suggest that students be asked to describe the government policy on euthanasia. What kind of policy would they want and why? They can be confronted with arguments against their policy. This could be done in a discussion form such as that offered by COLADA. It is important that students reflect on the way the specific case with all the details and emotions affects the choice of an abstract policy. The best reflection on this point would be reached when students starting with the program discuss the abstract issue first. They approach the topic mostly by rationality; then they can be confronted with the detailed and rich case. At this point, their sensitivity is activated. When talking rationally and abstractly about the euthanasia topic, they did not realize the complexity of a real-life case. Discussing the topic rationally and abstractly leaves a distance between the students and possible cases. However, when confronted with a real-life case, they empathize with it. The third part should consist of another abstract discussion about the policy on euthanasia. A final discussion should try to make the students aware of the differences between the abstract and the concrete, and of the ways both approaches can affect each other.

Acknowledgements

Our thanks are due to the following individuals, who hosted the research opportunities: Drs Frank de Mink of the Educational Centre, University of Twente, and Dr Robert Cavalier of the Center for the Advancement of Applied Ethics, Carnegie Mellon University.

Notes

1. Ir. (Engineer) Marika Hettinga now works as a member of a development team for multimedia learning resources for a higher-education institute in The Netherlands. Dr Betty Collis is a faculty member in the Faculty of Educational Science and Technology at the University of Twente in The Netherlands. This paper reflects work done in fulfilment of the graduate (engineer's) degree by the first author previous to her employment under the supervision of the second author under a special collaborative arrangement between the Faculty of Philosophy and Social Studies and the Faculty of Educational Science and Technology.

2. Developed at the Faculteit der Rechtsgeleerdheid, Rijksuniversiteit Limburg. For information, contact Fokke Fernhout.

References

Alessi, S.M. and Trollip, S.R. (1985), *Computer-Based Instruction*, Englewood Cliffs NJ, USA, Prentice Hall.

CAAE (1992), 'The Dax Project, review of the design of the study', internal report on an evaluation, Center for the Advancement of Applied Ethics, Carnegie Mellon University, Pittsburgh, USA.

Covey, P.K. (1993), 'Of balloons and bicycles, multimedia and ethics', paper for the 1993 Computers & Philosophy conference of the Carnegie Mellon University, Pittsburgh, USA.

Gilligan, C. (1982), *In a Different Voice: Psychological Theory and Women's Development*, Harvard University Press, Cambridge, Mass., USA.

Hettinga, M. (1993a), 'Het COLADA-project: bedrijfsethiek op de computer, verslag van een stage bij het Onderwijskundig Centrum', unpublished report on an internship at the Educational Centre, University of Twente, The Netherlands.

Hettinga, M. (1993b), 'De computer als ethicus, een onderzoek naar ethiek-onderwijs en educatieve software vanuit de ideeën van de rechtvaardigheidsethiek en de zorgethiek', unpublished Master's thesis, University of Twente, The Netherlands.

Hettinga, M. (1993c), 'The THEORIA project: compelling ethical multimedia, report on an internship at the Center for the Advancement of Applied Ethics', unpublished report, University of Twente, The Netherlands.

Kohlberg, L. (1981), *Essays on Moral Development, Volume 1: The Philosophy of Moral Development*, San Francisco, USA, Harper and Row.

Mink, F.B. de (1991), 'Cases met COO bij Ethiek-onderwijs', paper presented at the

Onderwijs Research Dagen 1991, Symposium Leren van Abstracte Begrippen, University of Twente, The Netherlands.

Nielsen, J. (1993), *Usability Evaluation*, Boston, USA, Academic Press.

Reeves, T.C. and Harmon, S.W. (1993), 'Systematic evaluation procedures for instructional hypermedia/multimedia', paper presented at the annual meeting of the American Educational Research Association, Atlanta, Georgia, USA.

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

Shneiderman, B. (1987), *Designing the User Interface*, Reading MA, USA, Addison-Wesley.

Watkins, B.T. (1992), 'Videodisks bring "dimensions of emotion" to ethics education', *Chronicle of Higher Education*, March 4.