

A Very Big Adventure: Using the internet to enable multi-institutional collaboration in teaching computer ethics

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Abstract

Teaching and learning in any subject can sometimes become mundane but in order that our students are motivated it is sometimes necessary to use an approach which makes the process *a very big adventure*. Over the past three years studies have taken place with students from the University of Limerick in Ireland and students from two other universities in England and the USA in the teaching of Professional Issues in Software Engineering PISE (Griffin, 2001, Griffin et al 2000a and 2000b). PISE focuses on the legal, ethical and social aspects of computing. The ethical strand of this module, which aims to develop moral reasoning in the learners, has in the author's experience often proved to be the most difficult for students to grasp and consequently has had a de-motivating effect on some learners. To deal with this situation the author decided to investigate methods by which students might be motivated and therefore gain more from their learning experiences and develop their moral reasoning abilities. The method adopted has been the use of virtual learning groups using internet based asynchronous communication tools to enable learners who would otherwise physically be unable to meet to come together in cyberspace and discuss moral issues relating to computer systems.

This paper describes two cycles of the study, the results obtained, lessons learned and a proposal for a multi-cultural approach to be used in future studies. Analysis of the development of moral reasoning by pre- and post testing students using Moral Judgment Test (MJT) (Lind, 2001) is provided. The results of this research will be of value for both academic and practitioners in the area of computer ethics and moral reasoning.

Introduction

Over the past three years the author has been evaluating a multi-institutional approach to teaching and assessing students on courses that deal with computer ethics (Griffin, 2001, Griffin et al 2000a and Griffin et al 2000b). In these studies, students from the University of Limerick in Ireland (UL), de Montfort University in England (DMU) and Sacred Heart University in the USA (SHU) who were following similar courses, worked together in virtual learning groups to solve moral dilemmas. Groups were established with students from each institution

represented in roughly equal numbers. Each group selected a scenario from a list supplied by the course tutors and worked over a six week period using asynchronous communication tools provided by the Blackboard system (see below). On completion of this assessment task groups were independently graded according to an agreed grading scheme by course tutors from the three participating institutions.

The Moral Judgment Test (Lind, 1986) was also used to assess what if any changes may have occurred in students' moral reasoning while working in multi-institutional virtual groups. Analysis examined the changes in the MJT C-index (Lind 2002 and see below) from the pre course stage to post course stage. Reasons for the changes in this score have been used to suggest alterations to the design of collaborative teaching in this academic field.

In the first field study there was no significant difference in the C-index scores of learners in multi-institutional groups compared with those in control groups from a single institution. In a follow up study differences were noted. It is now proposed to expand the range of learners and institutions involved to include faculty and students from non-Western cultural and ethical traditions in future cycles of this work.

Why use collaborative learning and assessment?

The use of a problem based collaborative teaching/learning strategy has been shown to help develop deeper understanding of subject domains (Dukerich et al, 1990). Research also shows that teamwork encourages social facilitation, better learning and higher cognitive skills (Hiltz, 1994).

Research has also shown that deeper understanding of moral dilemmas can often occur by working collaboratively (Peek et al, 1994) and that the collaborative approach to learning, supported by instructional technology can lead to deeper understanding and new knowledge creation. (Mäkitalo et al. 2001, Cravener, 1999, Harasim et al, 1995).

Furthermore as a way of motivating students this collaboration was also assessed. As Fahraeus et al (1999) states "teachers motivate students to contribute ... by giving them credit for contribution". Students in this study were given a percentage of the total marks for individual contribution as well as achieving a grade for the group work.

Measuring moral reasoning

Assessment of learners traditionally uses exams or essays to establish what, if any, learning has taken place following a period of instruction but whether or not these assessment exercises actually tell us anything about the development of moral reasoning in the learner is open to question.

Lawrence Kohlberg (1958, 1964, 1984) has proposed one approach that might be used to measure moral reasoning which he based on the work of Piaget (1965/1932).

Kohlberg believed, as did Piaget, that people progress through a series of stages in their moral reasoning development. But unlike Piaget he believed intellectual development doesn't stop at 12. This work eventually led to Kohlberg's six stage model on which the Moral Judgment Test is based.

Table I shows the six stages of moral judgment that Kohlberg eventually identified (Kohlberg, 1984)

LEVEL	STAGE	SOCIAL ORIENTATION	DESCRIPTION
Pre-conventional	1	Obedience and punishment	Fear of punishment
	2	Individualism & Exchange	Returning favours
Conventional	3	Good interpersonal relationships	Putting yourself in other's shoes
	4	Social Order	Avoiding societal breakdown
Post-conventional	5	Social contract & individual rights	Obeying the law and upholding rights such as liberty and life
	6	Universal Principles	Guided by principles of justice, human rights and human dignity

Table I: Kohlberg's Six Stages of Moral Judgment

Perhaps the major difference between Kohlberg's definition of moral judgment and that of Piaget was that Kohlberg defined morality in affective, cognitive and behavioral terms. In the affective domain the individual has moral ideals. These then guide moral behaviour. But for that moral behaviour to be morally mature there needs to be developed reasoning competencies. Figure I below summarises this.

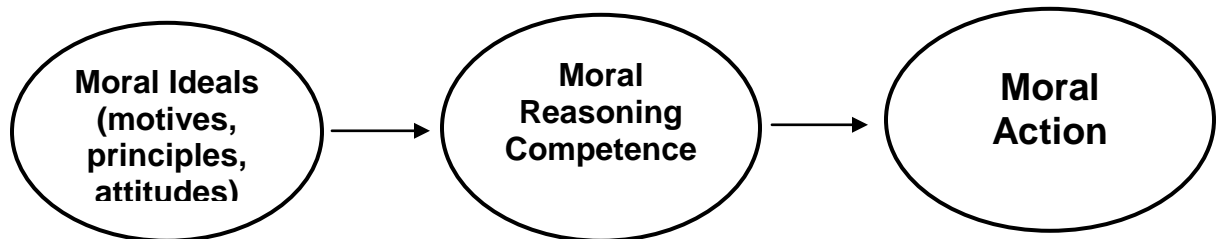


Figure 1: Aspects of Moral Behaviour (after Lind 2002)

The relationship between these three aspects of morality led to the development by Kohlberg of criteria for the measurement of moral reasoning, the Moral Judgment Interview.

Lind (1986) took this idea one stage further by developing the Moral Judgment Test (MJT) where subjects were presented with moral dilemmas and a number of different responses (organised into pro and con statements), each response representing a different stage of Kohlberg's six stage model. Subjects were then asked to rate their agreement with the response on a nine-point scale from -4 to +4.

The MJT was designed so that it satisfied the main postulates, as laid down by Kohlberg, for an adequate moral reasoning measurement tool. These include:

- the ability to measure both the cognitive and affective aspects of moral behaviour
- the inclusion of a moral task
- non-fakeability (i.e. subjects should not be able to get scores higher than their moral reasoning competency)
- sensitivity to change, measure the subject's own moral principles rather than imposing external moral expectations
- equivalence of both pro and con arguments in terms of Kohlberg's six stages.

The MJT uses two moral tasks to assess the subjects' moral reasoning level. The dilemma is defined by Lind as "a situation in which a person cannot make a decision without transgressing an important moral rule or principle" (Lind 2002). In the MJT the moral dilemmas were concerned about a mercy killing situation, the Doctor's Dilemma and a Worker's dilemma about the employees' and employers' rights and the rule of law. The moral task is contained in the arguments that the subject is asked to score.

The Blackboard system

The Blackboard (www.blackboard.com) Collaborative Learning Management Tool (CLMT) is an integrated set of web-based tools designed for the creation, management and use of a learning environment. Using the tools provided the following facilities: publication of learning materials (including links to module related websites); publication of announcements; collaboration using bulletin boards and chat rooms; communication tools such as email

In this study the main collaborative work was carried out by students working in virtual learning groups using facilities provided from the Group Pages (Figure 2). The Discussion Board provided asynchronous communication while the Virtual Chat provided the synchronous communication facility. Students could swap files and send emails to other group members using the File Exchange and Send Email tools. Only members of a particular group and the module tutor could

access that group's page and tools. Over 80% of usage was on the group Discussion Board.

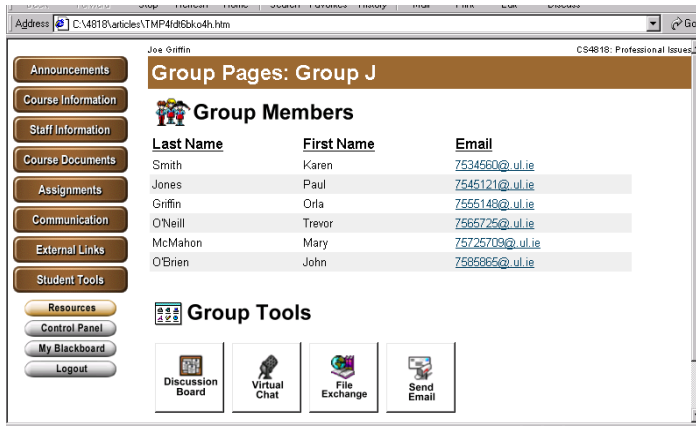


Figure 2: Group Pages (identities have been changed) here.

The Studies

Students from the collaborating universities worked in groups of six to analyse a moral dilemma. In most cases there were equal numbers from all three institutions in each group. To avoid differences that might have occurred in the teaching environments of the three universities results were compared only using the data from students at UL. Also, as there were more students studying this course at UL than at the other two institutions, the C-index scores of members of groups of only UL students were used as controls.

It was hypothesised that there would be a greater difference in the C-index score of those in the international groups when compared with those in the single institution groups. A C index score of >5 indicates that there has been a measurable improvement in moral reasoning. Figure III below summarises the main findings.

Results

In the first study no significant difference was found in the C-index scores of students in multi-institutional groups when compared with those in single institution groups. There were a number of reasons why this could be so. These were identified as:

- the asynchronous nature of the tool (often students were waiting before they could move on to the next task)
- lack of organization skills of students in using this kind of media for division of work (they just expected things to happen rather than specifically articulating them)
- lack of roles within the group (the groups that achieved the highest grades, took our suggestion to have group roles, those that did not had no leader or organizer and students just expected others to do the work)

- perhaps this seemed less pressing because it was virtual and not “real” (no tutors constantly monitoring progress as opposed to other course where there might be constant pressure from regular face to face tutorials)
- allowing virtual groups to self organise (setting own deadlines and milestones)
- more time to get to know each other, to articulate their strengths and weaknesses
- the nature of the moral dilemmas and whether these gave the learners the opportunity to develop moral reasoning
- test fatigue from using the same moral tasks for both pretest and post test situations

It was decided to address as many of these issues as possible and to re-run the study in the next academic year. Again the same design was used but with more emphasis on creating, managing and sustaining the virtual learning groups. In this study some differences were noted in the C-index scores achieved and these are summarised in Figure 3.

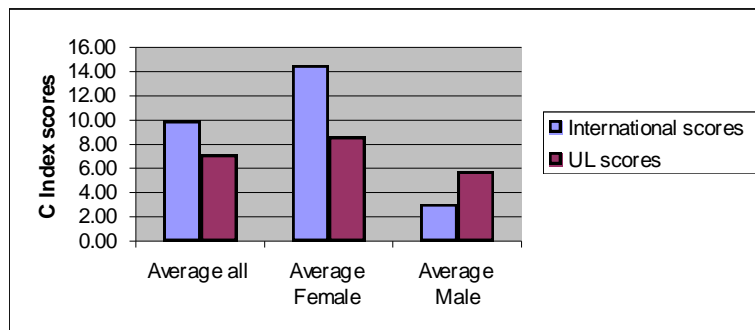


Figure 3: MJT averages.

As can be seen there is a positive difference between the scores achieved by those in the international groups when compared with students in single institution groups. However this difference is less than 5 so although it demonstrates a trend it does not unambiguously indicate that there has been improvement in moral reasoning as measured by the MJT.

Of more interest is the difference achieved by male and female students. As can be seen the average increase for female students is greater than that for male. In the case of females those in international groups scored 14.44 while those in single institution groups scored 8.59. In the male groups the international did not achieve a difference of more than 5 (they achieved 3.08) indicating that on average there is little evidence moral reasoning development taking place with these learners (but this may be due to test fatigue). Even in the UL group male students only achieve a C index score of just over the minimum (5.74 in this case).

So what if anything can we learn from these results?

Firstly that there is a greater improvement in moral reasoning development as measured by the MJT when learners participate in collaborative virtual learning groups when compared with the results achieved by learners in single institution groups. Secondly that there is a greater measure of improvement for female students than for male students. This may well be to do with the fact as indicated in some research studies that females are more likely to collaborate whereas males are more likely to compete. Thirdly, care needs to be taken in establishing and sustaining virtual learning groups.

Conclusion

This study is part of ongoing research. The aim is to investigate what factors in the design of a learning environment can have a positive effect on the development of moral reasoning in learners. The use of collaborative learning situations that allow asynchronous communication in virtual learning groups appears in this study to have some merit in helping our students to develop increased moral reasoning. Anecdotal feedback also indicates that learners are more motivated by the experience of collaborating with contemporaries from other institutions. There is still more work to be done in the choice of case studies and the effective use of virtual learning groups but a trend appears to be becoming evident that this approach can have beneficial outcomes for learners and be part of the very big adventure that learning should be.

Work is currently underway to expand the range of students and faculty involved in this multi-institutional approach. Colleagues who teach in universities in Malaysia, India and Sri Lanka are now involved with the author in developing multi-cultural materials for teaching computer ethics and these will be assessed using the same collaborative methods described in this paper. It is hoped that further developments can be discussed in the presentation later this year.

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