The Use of Communications and Information Technology to Support Small-group Teaching Activities in Psychology

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In this article we discuss with examples ways in which Communications and Information Technology (C&IT) can support small-group activities in Higher Education with a main focus on psychology. Identification of the range of C&IT used to support small-group activities will not only illustrate how educational objectives traditionally associated with seminars and tutorials can continue to be met even when class sizes increase but also provide exemplars of educational innovation within this area.

The findings reported here are based on the work of the ASTER (Assisting Small-group Teaching through Electronic Resources) project which is led by The University of York with project partners at the University of Oxford, University College Northampton and the University of Surrey and funded under the UK Higher Education Funding Council for England (HEFCE) TLTP3 programme. The project aims to explore how communication and information technologies (C&IT) can assist students and lecturers in making the most effective use of small-group learning and teaching. The discipline areas investigated include psychology, physics and a variety of disciplines from the humanities.

The variety of C&IT in small-group teaching and learning

Researchers and practitioners tend to give different reasons for justifying the introduction of C&IT into small-group teaching. The rationale cited in the research literature is often stated in pedagogic terms, such as 'to facilitate deep-learning', 'to practice problem-solving' and 'to develop critical thinking skills'. These aims are met by objectives such as 'encouraging and increasing participation' and fulfilled by students engaging in tasks that facilitate discussion and writing. Providing transferable skills and finding practical solutions to maintaining small-group teaching in the face of larger class sizes are also cited. Authors that explicitly state models of learning tend to use constructivist or social context models with an emphasis on student-led approaches.

In practice, the 41 lecturers interviewed for the ASTER survey (Trapp et al., 1999) focussed on pragmatic reasons for introducing C&IT: large class size; providing improved resources; facilitating discussion; increasing student involvement and interest; keeping students on-task; providing more consistency and fairness; quicker feedback; flexibility of time management; increasing discussion opportunities; making courses more interesting; and improved contact time.

A simple way of classifying the use of C&IT to support small-group activities is in terms of providing content, of supporting the learning process and of managing course administration. Examples from psychology that fit into these categories are listed in Table 1. Full descriptions of

these examples based on interviews with students and lecturers can be found on the ASTER web site at http://cti-psy.york.ac.uk/aster/.

Category	Use	Brief description
Content provision	Course delivery	Complete course on the Web
		Email delivery of material replaces lectures
		Convert lectures to multimedia for web delivery
Supporting the learning process through construction and integration	Explore examples	Web multimedia clips of developmental and social behaviour
	Support for lectures	Overheads and exercises on the Web
		Provision of internal (e.g. course notes) and external (e.g. support materials for course texts)
		Demonstrations and simulations adapted for the Web
		Email used to deliver support materials
		Lecture handouts and old examination papers on the Web
		Web resources to support research methods course
	Student projects	Software used for demonstration purposes earlier in course is subsequently used for project work
	Use in laboratory practicals	Web clips used in laboratory on observational methods
		Remote access to analysis packages
	Assessment	Web-based multiple choice test with feedback
Supporting the learning process through dialogue	Communication	Group tutorials on the Web, with email question and answer sessions
		One-to-one student-tutor discussion
		Students ask questions over email
	Communication plus resources	Use of simulated environment (MOO) for seminar, with resources, assignments, discussion facilities
		Email dialogue with tutor and FAQ list integrated with support resources for research methods course

	Preparing for face-to-face	Email used to circulate information and instructions about tutorial sessions
Course administration	For lecturers	Web-based communications software used by faculty and administration staff for management of teaching
		The accumulation of a large corpus of departmental web resources enables tutors to assemble components into support materials for their courses
	For students	Web pages contain information and resources for course as a whole and specific modules
		Use of email to distribute general course information
		Handbooks, timetables on the Web

Table 1. Summary of uses of the Web from ASTER case studies

C&IT can provide content

C&IT is an important provider of course content in the form of source material, tutor notes, worksheets, case studies, support materials, data, web resources and tutorial software. These may be used by students as background prior to classes, to provide examples and discussion material during a small-group session or for information or remediation after formal lessons.

With increasing student numbers, small-group teaching sessions are an expensive form of learning and so it makes sense for staff and departments to ensure that when small-group teaching does happen it is as effective as possible. Allowing students to have access to content materials prior to a seminar or tutorial can shift the balance of activities that take place during the session towards more discussion and interactive work. One example of this approach includes the provision of resources on the Web prior to the seminar thereby allowing the seminar to focus entirely on integration and application of knowledge using case studies and discussion questions. Another example is where the Web is used not to support dialogue directly but to provide materials and instructions to ensure that all students are 'up to speed' prior to a face-to-face meeting. In this example the Web is used to make available summaries of papers by students which all members of the group are required to read before the face-to-face session.

C&IT can support the learning process

Mayes (1995) has proposed a simple framework for considering the stages or processes that a learner typically passes through in a learning cycle of gaining understanding of a topic. Mayes' framework is based in part on Rumelhart and Norman's (1978) description of three modes of learning: structuring (involving the formation of new schemata); accretion (adding new knowledge to exisiting schemata); and tuning (the fine adjustment of knowledge to the demands which are made of it). According to this framework, once the learner has acquired some basic

knowledge of the topic, they move into the construction stage, and start to interpret this knowledge in terms of their prior knowledge and their particular goals and motivations, and linking and classifying information in new ways; in short, to build up personal meanings. This construction process may be helped through tools to select, analyse and explore such as simulation, multimedia, assessment and reflective software.

The use of simulations to increase understanding of dynamic and complex processes can be found in psychology. Both Morris (1998) and Cumming and Thomason (1995) describe the use of simulations to correct common misconceptions in understanding statistics. An example of this type, *SPEED* (Hammond and Askins, 1999), is illustrated in Figure 1. Another simulation found in psychology is the *COR* software used to teach observational research.

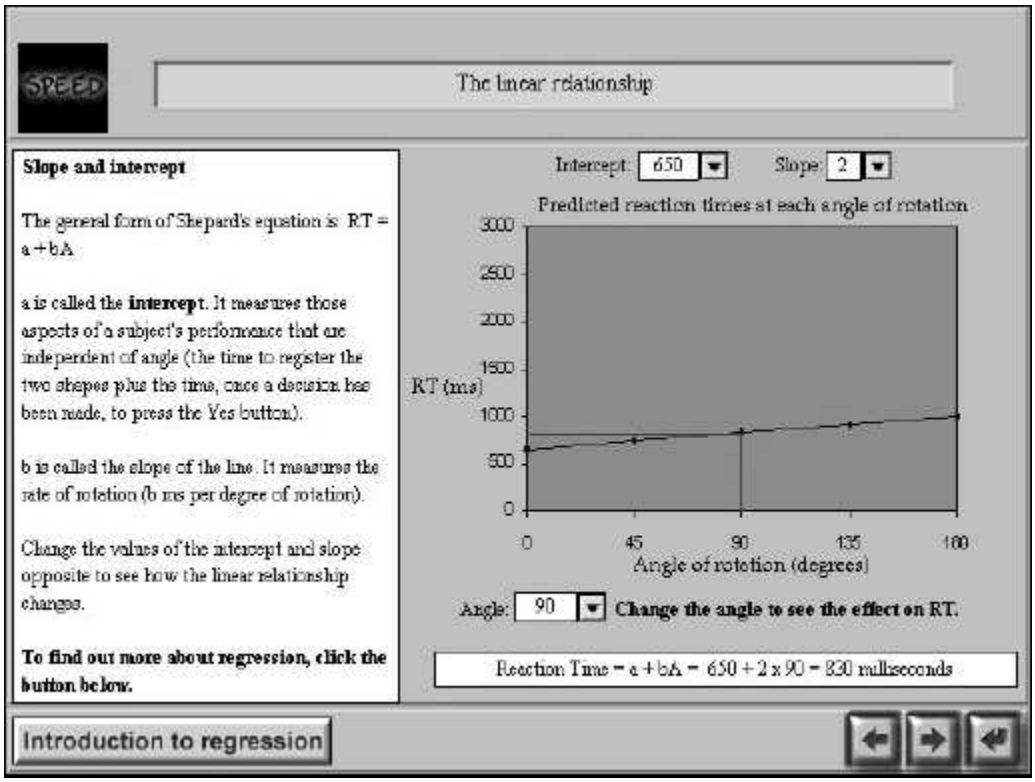

Figure 1. *SPEED*: a computer based tutorial on correlation and regression (Hammond and Askins, 1999)

The use of videos to support small-group teaching is well known. Dequeker and Jaspaert (1998) report on 20 years' experience with video-supported small-group learning for problem solving and clinical reasoning. The ability to incorporate video clips into software or web resources allows more opportunity for them to be integrated into small-group activities. Multimedia software can therefore provide a dynamic medium to support the construction and integration of knowledge. Examples within psychology include students exploring multimedia clips on developmental and social behavior in preparation for a discussion in class.

According to the Mayes model, the learner benefits from reflecting upon, sharing and discussing his or her understanding. The understanding has reached a point where key concepts can be articulated, evaluated and refined both through self-reflection and discussion with others. This process (and indeed the construction process) may lead to the formulation of new questions or the identification of further issues for study, thus closing the loop.

The use of the Web to support dialogue processes in learning falls into three types of usage: preparing students for later face-to-face communication; the use of the Internet for either one-to-one or group discussion; and an elaboration of this where contributors share electronic resources over which discussion may be focussed. At the simplest level the use of email provides a convenient method of communication with which the student has time to compose the question or comment (without having to wait for the tutor to be available) and the tutor can answer at a convenient time and with a due level of reflection.

There are examples of materials created by psychology students available on the Web, such as at Miami University's Psybersite which provides a gateway to web tutorials on a variety of topics in the field of psychology. All of the educational modules at this site have been created by advanced undergraduate and graduate students at Miami University. These activities were designed to increase student motivation and encourage active involvement as described by Sherman (1998).

So far in ASTER's work we have not found examples of the use of specific facilities to aid the construction of 'personal representation', such as concept mapping tools. This is not to say that such learning activities do not take place, but if they do they are relatively rare.

An interesting use of software to support peer-based tutorials is reported by Tolmie and Anderson (1998). The software helps to pace students through consideration of various aspects of their project design procedure. There are three two-hour sessions in total, undertaken by groups of 3-4 students working on related topics. In each session, the software proceeds by identifying key issues and asking the group to discuss these as they apply to each student's project in turn. The reflection stimulated by this discussion is then consolidated into firm decisions through report-back sessions with supervisors.

Within psychology we found examples of lecturers introducing C&IT in order to provide rapid feedback to students on assessment tasks such as self-study worksheets. On one course, assessment of practical work formerly marked by a team of postgraduates had been replaced by automated assessment in order to obtain more consistent marking. Formative self-assessment can be popular with students and many publishers now provide formative self-assessment resources over the Web.

C&IT can help with the organisation and administration of courses

Electronic resources can assist with course organisation by facilitating dissemination of relevant information and communication with students. There is no doubt that introducing C&IT can create a more flexible learning environment for students who might have difficulty fitting in with

a traditional campus-based timetable. For example, group project meetings conducted electronically mean that students can communicate without space or time restrictions.

Virtual learning environments can also provide a structure for group members' participation as well as providing clear demarcations of the individual group members' contributions.

With increasing constraints on staff time and flexibility of course structure, the use of C&IT in small groups can provide students with opportunities to practice skills without increasing the teaching load on staff. Video-conferencing provides another potential time-saver by enabling students to have lessons with staff based in different institutions.

Conclusion

The simple framework provided here has allowed us to categorise a broad range of ways in which C&IT is being used to support small-group activities within psychology. We hope that the examples will provide ideas that can be used and modified by other lecturers to enrich and support small-group activities on their courses.

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