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PAPER 4

CULTURAL DIFFERENCES REFLECTED BY AN INTEGRATED MEDIA
CHEMISTRY COURSE - AN AMERICAN/ISRAELI PERSPECTIVE

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ABSTRACT

Telecourses, educational packages with a pronounced video component, have been produced to be used in distance education at the university level. The creation of these courses and access to them is unequally distributed around the world. The limiting factor is not necessarily the availability of materials, but instead the need to adapt the course to the needs of different countries. The first author is the co-director of "The World of Chemistry" telecourse, which had an initial target population of U.S. college students pursuing non-science majors. The telecourse is currently being used by other populations in the U.S. and abroad. At the Open University of Israel, "The World of Chemistry" is being adapted and formally evaluated for Israeli students. Since the course uses a strong Science, Technology and Society approach, it calls for careful tailoring to allow for cultural differences. The Israeli adaptation process is being compared to adaptation processes in the U.S.

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The "World of Chemistry" telecourse was taught at the Open University of Israel during the 1992 spring semester and the fall and spring semesters of the 1992-93 academic year. In our research we investigated the cognitive and affective effects of the study of chemistry through the exposure to the telecourse and its various components.

For the first two semesters, the populations were nursing students in their first year of study, with the focus of their studies being social sciences. Each group met once a week for 15 weeks, 3 hours per meeting. Students watched telecourse programs in the class together with their instructor. In each tutorial meeting, the video program was used for a different teaching strategy: a trigger for discussion, class demonstration, part of a lecture, motivation, calculations, and/or question and answer session. For example, programs 3 (Measurement) and 11 (The Mole) were used as motivational

programs for solving quantitative problems.

The students in the last semester were of varying backgrounds and studies. The majority were students focusing their studies on the life sciences, with a few whose focus was the social sciences.

This group studied in a conventional distance-learning style. All video programs were viewed at home, accompanied by study guide materials (original plus additional Israeli). Six small-group meetings were held during the semester, two hours each. The main purpose of these meetings was to review the different topics, to solve problems, and to relate the different issues to local problems. For example: TOXICITY is a very real problem in every country. We used the debate in program 5 to lead into a discussion about local problems.

The curriculum was different for the two groups. The student nurses studied units 2 - 17 and 21 - 23, while the "conventional" group studied units 1 - 19 and 21 - 23. In order to evaluate the telecourse, we collected data using questionnaires, tests, and interviews:

- pre/post questionnaires (semantic differential and fill-ins)
- questionnaires to evaluate the effect of each video program and its components
- homework assignments and examinations that allow the identification of different cognitive problems.

Homework assignments included mini-projects such as a multi faceted analysis of newspaper articles. For example, one article was titled "Who Will Save the Ozone?". Students focused their attention on the conceptual basis of the article, identifying those concepts unfamiliar to them and speculating about societal and technological reliability of some of the statements. Students in general were not familiar with remedies for the Ozone hole and, in spite of the video coverage of the topic, some students wondered how it all came to be.

Another mini-project exploited the video program format. Each video in the series follows the same programming pattern. In this assignment students were asked to write a proposal for the second part of a video program. To accomplish this task, students had to combine their newly gained experience of chemical concepts with the various production elements of video. Students felt very uncomfortable with this assignment. Their discomfort stemmed from a sense of insecurity regarding their experience with both chemistry and video production.

In general, however, the results show that students enjoy the new experience of learning interactively with television. Their overall chemistry literacy improved, as did their attitudes toward chemistry and its study.

At the University of Maryland the "World of Chemistry"

course was taught in the Spring 1993 semester to 49 non-science majors. The format was three 50-minute lectures and a 50-minute discussion section each week. A video was watched at the start of each discussion section. The topic chosen was consistent with the subject of the lectures and did not necessarily proceed in the order of the units provided by the World of Chemistry textbook.

The course was designed to provide students with an introduction to the language and tools of chemistry. This was followed by discussions of various topics of chemistry relevant to the students' daily lives and driven, in part, by their expressed areas of interest. A major goal of the course was to demonstrate to the students that, regardless of their future occupation, chemistry is an important, relevant and necessary science. A second goal was that students should feel more comfortable with chemistry as a topic and more confident in their ability to learn about it.

With these goals in mind, students were assigned a writing assignment to provide a short paper describing the chemistry of some aspect of daily life. The book and video provided excellent starting points for many of the students. Papers were written on topics ranging from nuclear power generation to hair permanents.

The course also included regular quizzes, two exams and a final. There were two options for the final. One was a traditional exam consisting of short answer (free response) questions. The second option was to do a creative project that tied chemistry to some area of the student's interest. The connection to chemistry was allowed to be rather tenuous, although most students had a very clear and strong coordination between their topic and the chemistry involved in it.

About half the students chose to do projects. Many of these took the form of presentations to the class. For example, some students researched and provided a demonstration to the class including a discussion of the chemistry observed. Some chose to provide a one-on-one discussion with the professor (Harwood). Several students used portions of one or another of the video programs to enhance their presentation. For example, one group of three students used parts of the program on "Chemistry and the Environment" (Unit 25) to generate a class discussion on the issues surrounding the Love Canal case.

Of course, a number of students chose to write papers. These were required to be much longer and in more depth than the earlier assignment. Typically they were 15-20 pages in length. Topics ranged from beer to chemical safety in the workplace to film forming foams for fire extinguishing to a discussion of AIDS.

An unexpected choice for projects was a video based report. There were three of these of mixed quality. One student attempted to demonstrate a connection between chemical

bonding and dance. Another connected exercise, diet and chemistry. This video was supplemented by a short paper. The best of these took a documentary format. The student investigated drug use on campus. The video used models and discussed the region of the brain affected by drugs, both generally and with respect to the specific biochemistry of the brain. The student also took a survey regarding drug use and attitudes about drug use. This was followed by an on-screen interview with an admitted marijuana user and with a student who has chosen not to use drugs. The investigator then provided a summary and wrap-up.

The use of video as a primary or supplementary means of presenting information on science issues seemed quite natural to the students. So much so, that several chose this type of format for their own presentations. This demonstrates that the media can convey the message and maintain student interest. The video presentation provided a model to students for the discussion and dissemination of science information. In other words, imitation is the sincerest form of flattery.

This American experience with a video-based report is strikingly different from the Israeli experience with a video oriented assignment (discussed above). This disparity points to the different infiltration of video into the educational arenas in both countries.

Student attitude toward chemistry and self-assessment of knowledge regarding chemistry was measured by a pretest/posttest instrument also used by the Israeli team. After completion of the course, students felt their knowledge of forty topics had increased. This included areas that were not specifically covered during the course!

Topics covered by several videos and emphasized in lectures had the largest increase in felt knowledge. These included knowledge about the properties of chemicals and elements, bonding, isomers, oxidation-reduction, electrochemistry and polymers. These topics showed an increase of over one unit on a scale of 5.

Initially students had heard about these topics, but felt that the ideas were not entirely clear to them. After the course, students felt they clearly understood the topics and some students felt confident of their ability to explain the topics to another student.

This latter ability was encouraged in the writing assignment(s). In these assignments the "audience" was the class and students provided a review of another student's paper. Rewriting was encouraged to provide the best work.

It seems that a telecourse designed in one culture may be used as a basis for a telecourse in a second culture, while taking into account societal, economic and political issues. Cross-cultural adaptations should be accompanied by formative comparative evaluation so that a generalized model of

adaptation may emerge. We are presently engaged in extensive work towards this goal.

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