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ABSTRACT

This report describes a project at Rensselaer Polytechnic Institute (New York) to develop a curriculum that focuses on the social construction and use of science and technology in diverse cultural contexts. The program consists of both a minor and a three-course concentration on cross-cultural studies of science and technology. Courses covered science and technology in India, China, the Arab world, Latin America, and the Third World; a history of Japanese industrialization; and a component on technology, economy, and society. Humanities and social science courses were included to help give students a global understanding of the interrelatedness of the technical and social. The project also involved experiential learning projects, such as student exchange programs, co-op placements, internships, and community service, to promote interaction between students and individuals and/or communities of different cultures; a series of faculty development seminars in cross-cultural studies of science and technology; and a weekly film featuring one of various cultures represented at the college. Evaluations undertaken of the faculty seminars, the specific courses, and student cognitive achievements indicated that the main components of the project were successful. Appendices include three program brochures, faculty seminar evaluation questions, a student cultural knowledge questionnaire, and a form for student evaluation of the cross-cultural program. (SW)

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ED 416 759

Globalizing Education for Engineering and Science Students

FINAL REPORT

GRANTEE ORGANIZATION:

Rensselaer Polytechnic Institute
School of Humanities and Social Sciences
Department of Philosophy, Psychology and Cognitive Science
Troy, New York 12180

GRANT NUMBER:

P116B10737

PROJECT DATES:

Starting Date:	September 1, 1991
Ending Date:	January 31, 1995
Number of Months:	41

PROJECT DIRECTOR:

Professor John M. Koller
Department of Philosophy, Psychology and Cognitive Science
School of Humanities and Social Sciences
Rensselaer Polytechnic Institute
Troy, New York 12180
Telephone: (518) 276-6526

FIPSE PROGRAM OFFICER(S): Helene Scher (1991-1993), Joan Straumanis (1993-1995)

GRANT AWARD:		
	Year 1	$ 85,915
	Year 2	$110,840
	Year 3	$ 77,933
	TOTAL	$274,688

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Globalizing Education for Engineering and Science Students:

A FIPSE Project Model for
"Cross-Cultural Studies of Science and Technology"
Grant # P116B10737
Final Report

School of Humanities and Social Sciences
Rensselaer Polytechnic Institute
Troy, NY 12180

Summary

Our project addressed the need for engineering and science students to learn how to work more effectively in a culturally diverse world. We developed a curricular program focusing on the social construction and use of science and technology in diverse cultural contexts. Building on comparative and cross-cultural courses already in the curriculum, we developed both a minor and a three-course concentration in cross-cultural studies of science and technology that students can choose in partial fulfillment of their Humanities & Social Sciences core requirements. The core of the project consisted of six components:

(1) New courses that we developed; Science, Technology and Values in India; (2) History of Japanese Industrialization; (3) Water is Destiny: Science, Technology and Culture in Dynastic China; (4) Science and Technology in the Arab World.

(2) Courses that we modified; (1)Developed a third-world component for Technology and the State; (2) Developed a cross-cultural component for Technology, Economy and Society; (3) Developed the focus on science and technology issues for Modern Latin America.

(3) Experiential Learning Projects; We developed a series of capstone projects that involve interaction between students and individuals or communities of different cultures.

(4) Faculty Seminars; A series of seminars provided faculty development in cross-cultural studies of science and technology and aided curriculum development.

(5) Film Series; To give the program visibility and promote cross-cultural understanding, a weekly film featuring one of various cultures represented at Rensselaer, was shown and commented on by faculty.

(6) Evaluations: Evaluations of faculty seminars, specific courses, and cognitive achievements in the programs developed, indicate that the main components of the project were highly successful.

The outcome was to institutionalize at Rensselaer a minor and three-course concentration that: a) help students to recognize other cultures and work within and learn from them; and b) provides a model that can be adapted to other technologically oriented schools, where its relative compactness will give it practical advantages over programs requiring extended study abroad and/or extensive foreign language study.

Globalizing Education for Engineering and Science Students:

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Grant # P116B10737
Final Report

School of Humanities and Social Sciences
Rensselaer Polytechnic Institute
Troy, NY 12180

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Executive Summary

A. Overview Funding from the Fund for the Improvement of Postsecondary Education, (FIPSE) of the U.S. Department of Education (Grant # P116B10737) has enabled Rensselaer Polytechnic Institute to develop an undergraduate minor and a three-course concentration in *Cross-Cultural Studies of Science and Technology.*

B. Purpose The primary objective of the project was to develop a minor and three-course concentration to give students a cross-cultural understanding of science and technology through courses on world cultures and the world system as well as specific courses on science and technology in different cultures.

C. Background

Need for Project In the global society in which we live the ideas and technological artifacts that engineers and scientists produce move across national borders and diffuse through cultures with astonishing rapidity, and the scientific world view increasingly defines the outlook and aspirations of people around the world. Yet in the rigorous process of acquiring and maintaining the requisite skills for a technical career, scientists and engineers typically have little chance to investigate and understand the social and cultural dimensions of their work. Institutions such as Rensselaer educate the people whose scientific ideas and technological innovations help shape the globalization process. *They must also provide their students with a broad understanding of cultural values and processes enabling them to overcome cultural barriers in order to serve human needs worldwide.* The program's focus on cross-cultural studies is designed to use

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humanities and social science studies to give engineering and science students a global worldview that sees the inter-relatedness of the technical and social in some of its main cultural forms.

D. Project Description

The Faculty The faculty who have developed new courses and revised existing courses and who serve as advisors to the students in the program are drawn from anthropology, archaeology, economics, history, philosophy, and sociology.

Faculty Seminars To begin the process, faculty participated in a number of seminars during the first year in which each member of the committee made a presentation on their area of expertise relevant to the project. The discussions aimed at creating a shared understanding of key concepts. In the second year outside experts gave seminars and lectures. In the third year, the project faculty presented a series of lectures to the university community.

Film Series As part of the publicity for the program, the faculty also offered a one-credit mini-course titled "World Cultures Through Film." The course consists of a weekly film with each faculty member introducing the film and leading a discussion after the film. (Subsequently, the film series has been folded into the Introduction to Cultural Anthropology course.)

Courses Many existing courses were appropriate without modification. For example, "Cross-Cultural Perspectives on Science and Technology." This intermediate level course has five main components: multicultural aspects of the history of science and technology, intercultural communication in technical settings, medical pluralism and Non-Western medicines, technology and development, and policy issues.

Some existing courses were modified. For example "Modern Latin America," a broad survey course, has been changed to include sections on science, technology, and development. Specific issues include development projects in the Amazon, technology and indigenous peoples, technical aspects of the drug war, and environmental issues related to NAFTA. This model may be the most realistic for colleges that already have substantial offerings in area studies courses. One needs only to convince a core group of faculty who teach those courses to make some modifications and the college is well on its way to a minor.

Some new courses devoted specifically to science and technology issues in different areas of the world were added. For example, "Science, Technology, and Values in India" an interdisciplinary course taught by an economist and a philosopher, examines the relationship of cultural values to science and technology in India. "Science and Technology in the Arab World" and "The History of Japanese Industries" are other examples of new courses.

Structure of Concentrations For the three course concentration a student selects at least one course from a group of courses that introduces students to the concept of culture and involves significant cross-cultural comparisons; at least one course from a group of courses that focus on science and technology in diverse cultural context; and not more than one course from a group of courses that have a significant comparative or cross-cultural focus (the yellow brochure lists these three groups of courses as well as rationale and objectives of the concentration).

Structure of the Minor The minor consists of five three-credit courses. No more than one course can be at the 100-level (first-year level). Courses are divided into two main groups. Group A is a core group of courses that are about science and technology in different cultural contexts. At least two courses must be from that group, but up to four courses may be from that group. Group B is a group of related courses on different cultures of the world. Upper-level language courses that have significant social/cultural content are included in that group. Group B

is drawn from the existing curriculum. No more than two courses may come from Group B. (See the attached blue brochure titled "Minor" for more information.)

The fifth course, the minor capstone, is an experiential learning project that provides students hands-on, real-life experience with an ethnic or national group different from their own. Examples include working in a local Latino community center or participating in a conversational partners program for students with English as a second language. Students also complete a list of readings and to write up a short report about their experience. Both the three-course concentration and the minor in cross-cultural studies of science and technology fulfill a depth requirement in the humanities and social sciences required of all Rensselaer students.

E. Results and Evaluation

Results The principal results of the projects were the successful development and institutionalization of a three-course concentration and a minor in cross-cultural studies of science and technology. Faculty development through a series of faculty seminars has developed a faculty team with shared concepts and interests to carry on the project.

Evaluation Three evaluation instruments are administered to the students in addition to individual course evaluations, which are administered through the departments.

1. The Student Exercise involves a case study in which students are asked to read a short description of a development scenario and to write up what they think should be done. The student response is evaluated by a faculty committee according to a shared rating scale. At the end of the five-course sequence in the minor, students must review their original response and write up how they would change their original response, if at all. Again, that review essay is evaluated by a faculty committee according to a shared rating scale.
2. A second instrument, which is administered annually, consists of a multiple-choice questionnaire that evaluates students' knowledge about the culture concept and their attitudes regarding multiculturalism and ethnocentrism.
3. A third instrument, which is also administered annually, is a student evaluation of the courses and the program in general.

A pre-test, post-test evaluation was developed, with pre-test measures taken of 211 student in spring 1992. Subsequently, 18 students in the minor/concentration programs were tested and measured against the pre-test group. Test scores for program participants were significantly higher on the cross-cultural achievements items than the pre-test group (total number of correct items overall scored for control group was 30; for program participants 37).

The first comprehensive case study evaluation questions will be obtained in May 1995, providing a qualitive measurement of program participant's cognitive achievement.

Student evaluations for the new courses developed with the FIPSE grant have been uniformly enthusiastic.

F. Summary and Conclusions

Because this cross-cultural science and technology program meets an important need of science and engineering students being educated to live and work in a global environment without adding additional burdens on students and without requiring significant additional resources, it may well serve as a model for other universities that wish to develop multicultural curricula in their engineering and science programs.

FIPSE PROJECT REPORT #P116B10737

Project Overview

Our project addressed the need for engineering and science students to learn how to work more effectively in a culturally diverse world. We developed a curricular program focusing on the social construction and use of science and technology in diverse cultural contexts. Building on comparative and cross-cultural courses already in the curriculum, we developed both a minor and a three-course concentration in cross-cultural studies of science and technology that students can choose in partial fulfillment of their Humanities & Social Sciences core requirements. The core of the project consisted of six components: 1) new courses that we developed; 2) courses that we modified; 3) experiential learning projects; 4) faculty seminars; 5) film series, and; 6) evaluations.

The outcome was to institutionalize at Rensselaer a minor and three-course concentration that: a) help students to recognize other cultures and work within and learn from them; and b) provides a model that can be adapted to other technologically oriented schools, where its relative compactness will give it practical advantages over programs requiring extended study abroad and/or extensive foreign language study.

Background and Purpose

Our project began with faculty and conversations about the global context of education in the closing years of the twentieth century. The globalizing or production and finance has restructured the traditional bases of economic competition and has diminished the capacity or the state, relative to other social institutions, to assure the prosperity of its citizens. Advances in the destructive power or weaponry since World War II have made security increasingly contingent on cooperation to avoid conflict, rather than military preparedness to deter competitors or to prevail over them when deterrence fails. Environmental problems of global scale, such as destruction of rain forests and damage to the ozone layer, demand new forms or cooperation among nation-states and across cultures. Global transportation and communication networks have made it possible for distinct cultures to maintain their integrity over great distances, creating a new pluralism in the world's urbanized areas that has brought the promise of diversity along with the peril of misunderstanding and conflict.

These developments suggest three propositions about global change that hear directly upon the responsibilities of higher education. First, on the big issues of peace, prosperity and sustainability, it is increasingly difficult to disconnect the welfare of any particular social group from all social groups. Conflict and change can reverberate quickly through our complex global society, with unpredictable but potentially disastrous consequences, placing a premium on the capacity to cooperate as a means of avoiding and containing conflict. Second, science and technology have become core social institutions. The social relations which determine their functioning impinge on the grandest promises and the gravest threats to a global society. Third, our traditional assumption that foreign relations are mediated primarily through nation-state interactions is of diminished utility in a world increasingly composed of global networks of cultures, transnational enterprises, terrorist organizations, technological consortia and other non-state actors. The international system remains an important element of global society, but it no longer monopolizes control over cross-boundary exchanges among these networks as it did through most of the modern period. Taken together, these propositions suggest that a fundamental characteristic of global society is the appearance of diversity and complexity in all social spaces, as distinct from

the differentiations along national lines characteristic of international society. The whole is embedded in the constituent elements of global society, while in international society the whole is constructed from and limited by the parts.

Engineers and scientists occupy a special position in this context. The scientific ideas and technological artifacts that are the products of their endeavors move across national borders and diffuse through cultures with astonishing rapidity, and the scientific world view increasingly defines the outlook and aspirations of people around the world. Yet in the rigorous process of acquiring and maintaining the requisite skills for a technical career, scientists and engineers typically have little chance to investigate and understand the social and cultural dimensions of their work. Institutions such as Rensselaer therefore tend to educate people whose ideas and innovations help shape the globalization process, but generally do not educate the specialists on global and cross-cultures affairs who can place these changes in a broader context. The need for programs that can help our students understand other cultures and reconcile immediate concerns with the realities of global interdependence is thus especially urgent at institutions of our type. The humanities and social sciences have the expertise needed to develop- cross-cultural understanding, and so it is the responsibility of these disciplines to develop programs appropriate to different institutional contexts.

Need for the Program at Rensselaer:

At this point the need for the proposed program at Rensselaer became clear. Students who select Rensselaer tend to be practical-minded and narrowly focused on technical matters. They have high regard for science and technology, which they tend to assume have little or nothing to do with social processes and cultural values, which they therefore tend to regard as largely irrelevant to their intended careers. Consequently, there is a tendency to view the humanities and social science disciplines that study- cultural values and social processes as relatively useless subjects.

Although these initial student assumptions and attitudes are frequently challenged by Rensselaer faculty, particularly humanities and social science faculty, they are also reinforced by the spirit of a proud RPI tradition of being ready to solve technical problems immediately upon graduation. The heavy emphasis on basic science and engineering sciences and hands-on skills coupled with the strong encouragement of technical problem-solving tends to marginalize human and social concerns. As Arthur Bergles, Dean of the School of Engineering, noted, "The down side of this emphasis on engineering competence is that students' skills tend to be rather narrowly focused. The challenge then is for Rensselaer's engineers to gain a world view that will enable them to contribute fully to the science, art, and practice of global engineering."

It was this shared conviction that RPI students need a broader understanding of science and engineering that includes their social and cultural dimensions and that will enable them to live and work effectively within the global society that led to our project proposal. Our project addresses both this need and the need to get students interested in the study of the humanities and social sciences at Rensselaer. Our focus on science and technology was designed to appeal to their sense of the importance and usefulness of these subjects. Our focus on the cultural and social dimensions of science and technology was designed to channel their interest into humanities and social science studies. Our focus on cross-cultural studies was designed to use these humanities and social science studies to give students a global worldview that sees the interrelatedness of the technical and social in some of its main cultural forms.

Project Description

By focusing and building on existing curricula, we developed a program consisting of both a minor and a three-course concentration. The substantive focus was cross-cultural perspectives

on science and technology and the basic curricular structure was sufficiently "minimalist" to fit into the standard four-year engineering curriculum. Our emphasis on science and technology identified a variable that is both familiar to our students and central in the globalization process. The cross-cultural perspective defines these variables in terms of the diversity of social groups affected by science and technology without limiting our purview to interactions among or within nation-states.

In developing our program we built upon present faculty strengths and existing curricula. To this end we identified two sets of existing H&SS courses: (1) cross-cultural studies of science and technology courses and (2) courses that have a significant comparative or cross-cultural dimension. (Appendix A). To provide the breadth and depth needed for the minor, we modified one course and added four new courses to the first set. The second set was strengthened by modifying two existing courses. We also developed a course designed as an experiential learning project as a capstone for the minor. (Appendix B and C). To provide for faculty development and curricular integration we conducted a faculty seminar as part of the program development. To promote cross-cultural understanding on campus and to provide visibility for the program we offered an annual film series.

Evaluations/Project Results

Results The principal results of the projects were the successful development and institutionalization of a three-course concentration and a minor in cross-cultural studies of science and technology. Faculty development through a series of faculty seminars has developed a faculty team with shared concepts and interests to carry on the project.

Evaluation: Faculty Seminars: The major goals of the faculty seminars were to develop a shared understanding of the culture concept and to enhance faculty development. The evaluation of these seminars focuses on the extent to which the seminars achieve these goals. In order to assess the effectiveness of the seminars, a questionnaire was developed that measures faculty reactions to the seminar. This instrument includes ten multiple alternative items and three open-ended items where participants were asked to describe both positive and negative aspects of the sessions and provide suggestions for further improvement. This instrument was administered in March of 1991 to individuals that participated in the 1991-1992 sessions.

All seminar participants (seven individuals) responded to the questionnaire. The average response to each of the multiple alternative items is presented in Appendix D. In general, the reactions to the seminars are positive. The weakest areas appear to be in developing a shared understanding of the culture concept (item 3) and developing a common language for linking the various courses in the cross-cultural curriculum (item 10). However, one participant noted that the disagreement over the meaning of the culture concept was, in and of itself, enlightening and would lead to shared understanding in the future.

In addition to the multiple alternative items, open-ended responses revealed both strengths and weaknesses of the seminars. The major strengths noted were: (1) expert knowledge in diverse areas; (2) the opportunity to discuss different points of view and clarify concepts; (3) the opportunity for intellectual growth; (4) the development of a sense of team; and (4) improved communication between individuals from different disciplines.

The major weaknesses of the program noted were: (1) shortage of time to discuss such complex issues; (2) too few participants; and (3) not enough diversity within the group. Suggestions to improve the seminars included: (1) increasing the length of the meetings; (2) increasing the diversity of the group; (3) bringing in guest speakers and including more formal presentations; (4) more emphasis on the culture and technology connection; and (5) focusing the discussion by sharing major issues to be discussed in advance of the seminar meetings.

In general, the seminars met their major goal of increasing communication between diverse disciplines on the meaning of culture. Overall, the reaction to the seminars was positive. The major weaknesses noted by participants as well as suggestions for improvement will be addressed in the seminar program for the next academic year. Specific suggestions for improvement include: (1) the incorporation of a guest speaker program; (2) aggressive recruitment of individuals from diverse disciplines to participate in the seminars; (3) separating business meetings from the seminar meetings so that time spent on discussion of the issues can be lengthened; and (4) asking presenters to prepare, in advance, outlines of major issues and questions to be discused in the seminars.

Cross-Cultural Minor/Concentration: Learning Criteria

The initial evaluation plan proposed a pretest-posttest design with a control group to be used to assess the impact of the crosscultural studies programs. However, most students did not sign up for the minors and concentrations until after they had taken at least two required courses, thus pretest measures were not available for this group. Therefore, it was not possible to conduct a study with this type of design. Instead, an alternate design was used. This design is described below. In addition, two separate evaluation studies were to be conducted, one to assess the effectiveness of the cross-cultural concentration and one to assess the cross-cultural minor. However, there were not enough students in either of these categories to collect interpretable data. Thus, minor and concentrations were combined for the purpose of evaluation. Since these two programs have shared objectives, this was considered appropriate.

In essence, the purpose of this program was to enhance knowledge of cross-cultural issues and diversity and how they interact with technical and social issues. In order to assess how well students have acquired such knowledge, a test was developed based on the objectives and student outcomes stated in the grant proposal (pp. 21-23). The test developed consists of item based on the shared objectives of the concentration and minor (Appendix E). The test consists of both true/false (20 items) and multiple alternative questions (25 items) in order to maximize objectivity of scoring and ease of comparison between the participant and control groups. The tests were scored according to the number of items answered correctly. Each correct answer was assigned one point for a total possible score of 45.

Since individual programs of study vary depending on the specific courses chosen by students to fulfill their requirements, the test was developed to measure learning or cognitive achievement and focuses on a general understanding of the culture concept. Items were developed that assess cultural awareness and the interaction of culture with science and technology, political structures and society. These items were developed with the assistance of several faculty that teach required courses in the program.

Evaluation Study

In the Spring of 1992, pretest measures on the learning test were taken on 211 students enrolled in a variety of humanities courses. As mentioned earlier, pretest measures on the experimental group could not be collected because most of the students signed up for the minor/concentration after they completed most of their requirement. Thus, only posttest measures were available for this group. Since the control group and participants groups could be considered matched samples, scores obtained with the control group were used as pretest scores and were compared to the posttest scores of students participating in the minor or concentration in cross-cultural studies in science and technology.

Test scores were available for 18 students in the minor/concentration programs in cross-cultural studies in science and technology. A random sample of 18 students from the original

control group were chosen for inclusion in the evaluation study. Test scores for these two groups were compared to evaluation differences in knowledge and awareness of cross-cultural issues. Results of the evaluation study indicated significant differences between students who did not participate in the cross-cultural program (control group) and program participants. Statistical analyses were conducted using dependent t-tests for matched samples. The results indicated that participants had higher scores on the multiple choice questions, $t(17) = 4.79$, $p < .001$ and had a higher overall test score $t(41) = 4.00$ $p < .01$ than non-participants. The average overall test score for non-participants was 67% compared to 81% for participants. There were no significant differences between the two groups on the true/false section of the test. Descriptive statistics are presented in Table 1.

Table 1

	True/False		Multiple Choice		Overall Score	
	M	SD	M	SD	M	SD
Control group	17.50	1.58	12.56	4.54	30.06	5.39
Program participants	17.72	1.90	18.83	2.81	36.56	3.99

Note. N = 18 for all estimates.

Summary and Conclusions

Because this cross-cultural science and technology program meets an important need of science and engineering students being educated to live and work in a global environment without adding additional burdens on students and without requiring significant additional resources, it may well serve as a model for other universities that wish to develop multicultural curricula in their engineering and science programs. Toward this end, a brochure describing the project (Appendix G) has been sent to some 200 individual and institutions involved in cross-cultural studies and/or engineering and science education. There are also plans for articles in relevant professional journals.

Appendices

A 3-Course Concentration

B Minor Brochure

C Experiential Learning Brochure

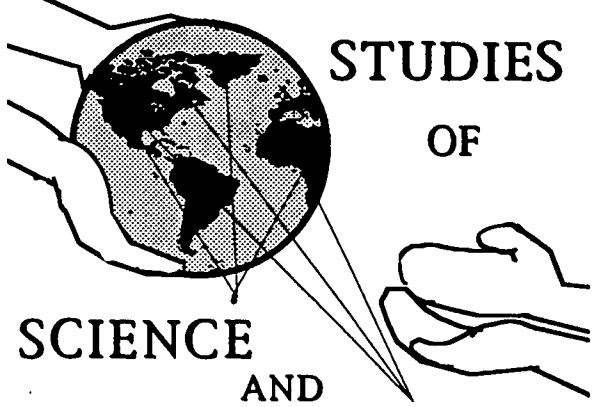
D Seminar Responses

E Student Test

F Student Scenarios

G Project Report Brochure

Our World is Getting Smaller.



3-Course Concentration

Be Part of the Solution!

The Challenge:

Education in the closing years of the twentieth century needs to take account of many profound changes in our world. The globalizing of production and finance has restructured the traditional bases of economic competition and has diminished the capacity of the state, relative to other social institutions, to assure the prosperity of its citizens. Advances in the destructive power of weaponry since World War II have made security increasingly contingent on cooperation to avoid conflict, rather than military preparedness to deter competitors or to prevail over them when deterrence fails. Environmental problems of global scale, such as destruction of rain forests and damage to the ozone layer, demand new forms of cooperation among nation-states and across cultures. Global transportation and communication networks have made it possible for distinct cultures to maintain their integrity over great distances, creating a new pluralism in the world's urbanized areas that has brought the promise of diversity along with the peril of misunderstanding and conflict.

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Rensselaer's Stance:

Rensselaer recognizes the need to take account of the many profound changes in the world today and accepts the responsibility to provide appropriate kinds of cross-cultural education for its students.

One Solution:

"Cross-Cultural Studies of Science and Technology" (a project funded in part by the Fund for the Improvement of Postsecondary Education, FIPSE) addresses the need for engineering and science students to learn how to work more effectively in a culturally diverse world. The Three-Course Concentration in Cross-Cultural Studies of Science and Technology was designed as one way to address this need.

The concentration requires an introductory course, which introduces students to the concept of culture and involves significant cross-cultural comparisons, and two additional courses, which are selected from cross-cultural science and technology courses and/or courses with a significant comparative or cross-cultural focus.

The Predicted Outcome:

The concentration will enable students to:

- appreciate the immediacy as well as the ubiquity of cultural diversity
- understand and use the culture concept
- identify basic characteristic of global society
- recognize the embeddedness of science and technology in culture
- identify different ways societies organize science and technology
- be able to compare cultural values and ideas.

Accept the Challenge!

Become part of the Solution!

All you need to do is:

Fill out the information on the reverse side of this tear-off;

Talk with a Concentration Advisor (they are listed below) and have the Advisor sign off on the reverse side;

Take the tear-off to the Philosophy Department in the Sage Building (room 3116) and exchange it for your registration card.

CONCENTRATION ADVISORS

Professor John M. Koller
Philosophy Department
SA 3118 Phone 6526

Professor Shirley Gorenstein
STS Department
SA 5506 Phone 6574

Professor David Hess
STS Department
SA 5602 Phone 8509

Professor Linda Layne
STS Department
SA 5518 Phone 6615

Professor Sal Restivo
STS Department
SA 5204 Phone 8504

Professor Raymond Stokes
STS Department
SA 5406 Phone 8516

Professor Romesh Diwan
Economics Department
SA 3408 Phone 6386

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YES!

I want to enroll in

Cross-Cultural Studies of Science and Technology

3-Course Concentration

(PLEASE PRINT)

First Name _____ Last Name _____

SOCIAL SECURITY NUMBER _____

CLASS OF _____ MY MAJOR IS _____

LOCAL OR CAMPUS ADDRESS _____

PHONE _____

I have advised this student regarding the 3-Course Concentration in Cross-Cultural Studies of Science and Technology.

Signature of Advisor _____ Date _____

CROSS-CULTURAL STUDIES OF SCIENCE AND TECHNOLOGY

3-COURSE CONCENTRATION

REQUIREMENTS:

A total of three courses, to include:
At least one course from Group A;
At least one course from Group B;
*Only one course at the 100 level.**

GROUP A: INTRODUCTORY COURSES

Choose at least one course from the following introductory courses as a prerequisite for Group B and Group C.

(These courses introduce students to the concept of culture and involve significant cross-cultural comparisons.)

45.1962	Medicine, Power, Gender
45.1964	Asian World Views
45.1963	Freedom and Culture
51.121	Sociology
51.151	Cultural Anthropology
51.253	Cross-Cultural Perspectives on Science and Technology
51.254	Sciences, "Pseudo-Sciences," and Popular Cultures
51.255	Family and Kinship

GROUP B: CROSS-CULTURAL SCIENCE AND TECHNOLOGY COURSES

(Prerequisite: one course from Group A)

(200 level: intended primarily for sophomores and juniors)

51.253	Cross-Cultural Perspectives on Science and Technology
51.254	Sciences, "Pseudo-Sciences," and Popular Cultures

(400 level: intended primarily for juniors and seniors)

43.486	The Cultural Context of Science
51.427	The Social Relations of Science
51.431	Public Policy & Human Ecology
51.452	Culture, Mind, and Medicine
51.453	Body: Self, Symbol, and Politics
51.468	Science, Technology and Industry in Comparative Perspective
51.469	Technology and the State
NEW	History of Japanese Industrialization
51.4962	Science and Technology in the Arab World
51.4965	Water is Destiny: Science, Technology and Culture in Dynastic China
NEW	Science, Technology and Values in India

GROUP C: COURSES WITH A SIGNIFICANT COMPARATIVE OR CROSS-CULTURAL FOCUS
(Prerequisite: one course from Group A)

(100 level: intended primarily for freshman)

51.1234	International Relations

(200 level: intended primarily for sophomores and juniors)

41.212	French IV
41.232	German IV
48.283	Eastern Religions
49.283	History Nineteenth-Century Europe
51.268	History of Contemporary Europe

(400 level: intended primarily for juniors and seniors)

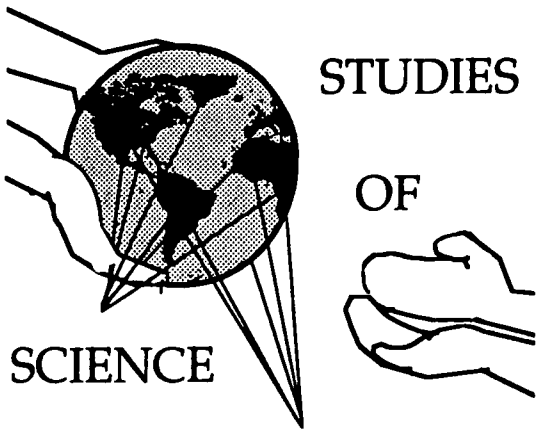
41.413	German V 20th Century German Culture and Literature (400)
41.416	German Literature of the Middle Ages (400)
41.417	German Novella (400)
41.418	German Drama (400)
41.440	Business French (400)
42.414	Science and Fiction in the 19th Century
42.419	Writers and Cultural Change
48.457	Buddhism
48.456	Indian Philosophy
51.496	Modern Latin America
51.420	China: Past and Present
51.433	World Politics
51.455	The Middle East Through Western Eyes
51.461	Twentieth-Century Germany
51.496	Ancient Latin America

*Appropriate topics courses and consortium courses may be substituted with approval of concentration advisor.

MINOR

IN

CROSS-CULTURAL



STUDIES

OF

SCIENCE

AND

TECHNOLOGY

MINOR IN CROSS-CULTURAL STUDIES OF SCIENCE AND TECHNOLOGY

Purpose to focus H&SS core education for those students interested in preparing themselves to live and work in a culturally diverse world.

Objectives:

- Become familiar with the values, social processes and institutions of diverse cultures.
- Explore interactions between scientific, technological, political, ecological, organizational, and cultural factors.
- Understand how cultural differences affect the social organization of scientific research and the construction of theory.
- Understand the interaction of modern science and technology with local systems of knowledge.
- Develop sensitivity to the cultural issues involved in development projects, and to the politics and power relations that they frequently inscribe.
- Learn how to carry out scientific and technical projects in diverse socio-cultural contexts.
- Establish a basis for the social assessment of technology in diverse cultural contexts.

REQUIREMENTS

A total of FIFTEEN credit hours are required.

- at least 2 courses from group A;
- two other courses that can be chosen from either Group A or Group B (no more than one course at the 100 level course can be counted toward the minor);
- an Experiential Learning Project.

FACULTY ADVISORS

Professor Romesh Diwan
Economics Department
SA 3408 Phone 6386

Professor Shirley Gorenstein
STS Department
SA 5506 Phone 6574

Professor David Hess
STS Department
SA 5602 Phone 8509

Professor John M. Koller
Philosophy Department
SA 3118 Phone 6526

Professor Linda Layne
STS Department
SA 5518 Phone 6615

Professor Sal Restivo
STS Department
SA 5204 Phone 8504

Professor Raymond Stokes
STS Department
SA 5406 Phone 8516

GROUP A:
cross-cultural science and technology courses

(100 level: intended primarily for freshman)
45.1962 Medicine, Power, Gender
51.111 Introduction to Science and Technology Studies

(200 level: intended primarily for sophomores and juniors)
51.253 Cross-Cultural Perspectives on Science and Technology
51.254 Sciences, "Pseudo-Sciences," and Popular Cultures

(400 level: intended primarily for juniors and seniors)
43.486 The Cultural Context of Science
51.400 Modern Latin America
51.427 The Social Relations of Science
51.431 Public Polciy and Human Ecology
51.452 Culture, Mind and Medicine
51.453 Body: Self, Symbol and Politics
51.468 Science, Technology and Industry in Comparative Perspective
51.469 Technology and the State
51.496 Science and Technology in the Arab World (NEW)
NEW History of Japanese Industrialization
51.496 Water is Destiny: Science, Technology and Culture in China
NEW Science, Technology and Values in India

GROUP B:
courses with a significant comparative or cross-cultural focus

(100 level: intended primarily for freshman)
45.1963 Freedom and Culture
45.1964 Asian World Views
51.121 Sociology
51.1234 International Relations
51.151 Cultural Anthropology

(200 level: intended primarily for sophomores and juniors)
41.212 French IV
41.232 German IV
43.242 Art of the Film
43.244 Popular Culture Genres
46.254 Film: Social and Political Themes
48.283 Eastern Religions
49.267 History Nineteenth-Century Europe
50.219 International Economics
51.255 Family and Kinship
51.268 History of Contemporary Europe

(400 level: intended primarily for juniors and seniors)
41.413 German V 20th Century German Culture and Literature (400)
41.416 German Literature of the Middle Ages (400)
41.417 German Novella (400)
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41.440 Business French (400)
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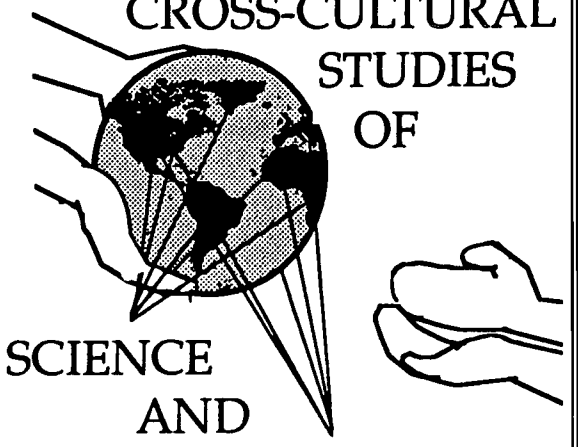
42.415 Science and Fiction in the 20th Century
42.419 Writers and Cultural Change
43.486 The Cultural Context of Science
48.456 Indian Philosophy
48.457 Buddhism
49.472 Metaphysics
51.420 China: Past and Present
51.424 Ecology and Society
51.433 World Politics
51.455 The Middle East Through Native and Western Eyes
51.461 Twentieth-Century Germany
51.496 Ancient Latin America

The Experiential Learning Project
45.496

Experiential learning projects will immerse students in a multi-cultural milieu involving appropriate science and technology issues. A variety of kinds of projects are available, including student exchange programs, co-op placement, internships and community service. You may also design your own project, subject to your project advisor's approval. Each project will be supervised by a faculty member and will require a final written report which will analyze cultural and technological issues and contexts.

APPENDIX C



CROSS-CULTURAL STUDIES OF SCIENCE AND TECHNOLOGY

Experiential Learning Project

Cross-Cultural Studies of Science and Technology

Experiential Learning Project

An Experiential Learning Project is a 3 credit capstone course for students who are pursuing a minor in *Cross-Cultural Studies of Science and Technology* .

The goal of the *Cross-Cultural Studies of Science and Technology* minor is to have engineering and science students recognize and work more effectively within the global society. The aim of the experiential learning project is to help students become familiar with the values, social processes and institutions of diverse cultures.

Experiential learning projects will immerse students in a multi-cultural milieu involving appropriate science and technology issues. These may include student exchange programs, co-op placement, internships and community service - or - design your own.

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Professor Raymond Stokes
STS Department
SA 5406 Phone 8516

Potential Experiential Learning Projects

Culture Learning Partners,
Contact: Jeannie Steigler

ELP students would be paired with students from culture different from their own. The students would then familiarize one another with the ulture different from their own.

Co-op
Contact: Diane Leis-Delker

tudents would have either a co-op or internship ith multicultural companies.

> The internship book in the Resource Area of Diane Leis-Delker's office is a source of internships that might be suitable for the ELP. Students would have to go through the book themselves.

nternational Students Office,
Contact: Kerry Geffert

. Students could participate in the Freshan Seminars for new international students.

. ELP students could help plan and carry ut multiculturalism week.

. Students could develop a mentoring rogram combined with Freshman Seminars.

. Students could mentor graduate student As about what American students look for in a A. ELP students could hold a small seminar each eek.

. ELP students could advise the RPI Office f Public Safety about how to get their rules and regulations across to International Students, perhaps by being on call with that Office for a semester.

6. ELP students could work with groups of International Students and the Chamber of Commerce to show the International Students how to shop, find churches, hospitals, etc.

7. ELP students could act as facilitators by explaining cultural behavior, ideas, etc. to groups of faculty and staff.

El Centro,
Contact: Doris Roman

El Centro has a summer program on life skills. The life skills program will continue into the academic year and the ELP could participate then in not during the summer. The program would consist of some of the following:

1. ELP students could go into the home and help members of the Latino community develop organizational and time management skills.

2. ELP students could help develop a mural project.

3. ELP students could help Latino parents interface with schools, e.g. what are expected of children on holidays, on class trips.

4. ELP students can accompany Latino residents to Hispanic shops and learn customs of daily life, e.g. shopping, preparing food.

English as a Second Language,
Contact Jeannie Steigler

RPI international graduate students learning English as a Second Language, in collaboration with undergraduate students seeking a minor in Cross-Cultural Studies through the School of Humanities and Social Sciences, will plan and present a series of six weekly participatory activities for youth in the Bethel Baptist Church After-School Program.

OTHER IDEAS FOR ELP PROJECTS
These are ideas that were suggested during the Experiential Learning Project Board Meeting, March 17, 1993. These ideas have not been fully developed.

PROFESSIONAL STUDENT OBSERVER/CONSULTANTS: Students would work with companies who are working on international projects. The example given by Kerry Geffert was NYNEX, located in Technology Park, who is developing yellow pages for Prague(?). Proctor and Gamble may also be an option.

EXCHANGE OF DIVERSITY TRAINING: If a company provides cross-cultural training for employees, perhaps we could do some sort of co-op where a student would visit the company and an employee would come to campus.

LIVING WITH A FAMILY OF ANOTHER CULTURE: It was suggested that a student could undergo an intensive two week study of another culture and then live with a family of that culture for two weeks.

DIRECT SERVICES TO FAMILIES: Students would go directly into the family's home to provide a service. Examples are: Teaching the uses of PCs; explain uses of, and procedures to get things such as driver's license, social security numbers, and child care, and; act as mediator, when needed, with different agencies.

This idea could also be used as an extension of the Institute orientation program. Students, while helping others to adjust to our culture, would learn the cultural constraints of entering the mainstream of another culture.

SENIOR SEMINAR: Students would be assigned a family to interact with to learn a ritual of that culture and the ideology of that ritual. The student would then present the ritual at the seminar.

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Evaluation of Faculty Seminars

FIPSE Project P116B10737

Cross-Cultural Studies of Science and Technology

Submitted by

Dr. Bernadette M. Racicot

May 5, 1992

Project Director: John M. Koller

The major goals of the faculty seminars are to develop a shared understanding of the culture concept and to enhance faculty development. The evaluation of these seminars focuses on the extent to which the seminars achieve these goals. In order to assess the effectiveness of the seminars, a questionnaire was developed that measures faculty reactions to the seminar. This instrument includes ten multiple alternative items and three open-ended items where participants were asked to describe both positive and negative aspects of the sessions and provide suggestions for further improvement. This instrument was administered in March of 1991 to individuals that participated in the 1991-1992 sessions (see Appendix A).

All seminar participants (seven individuals) responded to the questionnaire. The average response to each of the multiple alternative items is presented in Appendix A. In general, the reactions to the seminars are positive. The weakest areas appear to be in developing a shared understanding of the culture concept (item 3) and developing a common language for linking the various courses in the cross-cultural curriculum (item 10). However, one participant noted that the disagreement over the meaning of the culture concept was, in and of itself, enlightening and would lead to shared understanding in the future.

In addition to the multiple alternative items, open-ended responses revealed both strengths and weaknesses of the seminars. The major strengths noted were: (1) expert knowledge in diverse areas; (2) the opportunity to discuss different points of view and clarify concepts; (3) the opportunity for intellectual

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growth; (4) the development of a sense of team; and (4) improved communication between individuals from different disciplines.

The major weaknesses of the program noted were: (1) shortage of time to discuss such complex issues; (2) too few participants; and (3) not enough diversity within the group. Suggestions to improve the seminars included: (1) increasing the length of the meetings; (2) increasing the diversity of the group; (3) bringing in guest speakers and including more formal presentations; (4) more emphasis on the culture and technology connection; and (5) focusing the discussion by sharing major issues to be discussed in advance of the seminar meetings.

In general, the seminars are meeting their major goal of increasing communication between diverse disciplines on the meaning of culture. Overall, the reaction to the seminars is positive. The major weaknesses noted by participants as well as suggestions for improvement will be addressed in the seminar program for the next academic year. Specific suggestions for improvement include: (1) the incorporation of a guest speaker program; (2) aggressive recruitment of individuals from diverse disciplines to participate in the seminars; (3) separating business meetings from the seminar meetings so that time spent on discussion of the issues can be lengthened; and (4) asking presenters to prepare, in advance, outlines of major issues and questions to be discussed in the seminars.

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APPENDIX A

Questionnaire and Responses to Multiple Alternative Items

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Preliminary Evaluation
Faculty Seminars

The questions below are intended to provide feedback on the effectiveness of the faculty seminars that you have been attending over the last two semesters. The responses will be used to identify strengths and weaknesses of these sessions in terms of the stated objectives delineated in the FIPSE grant proposal. Please answer the following questions in the spaces provided.

Please indicate your agreement with the following statements on the scales provided.

1. The monthly faculty seminars will be useful in coordinating curricula for cross-cultural studies courses.

---

1 2 3 4 5 6 7
strongly disagree — strongly agree

2. The monthly faculty seminars will be useful in developing common goals for the cross-cultural studies courses.

---

1 2 3 4 5 6 7
strongly disagree — strongly agree

3. The monthly faculty seminars have been useful in developing a shared understanding among participants about the meaning of the culture concept.

---

1 2 3 4 5 6 7
strongly disagree — strongly agree

4. The monthly faculty seminars will be useful in helping participants to achieve integration among the courses in the program.

---

1 2 3 4 5 6 7
strongly disagree — strongly agree

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5. The monthly faculty seminars will be useful to faculty in preparing students for the experiential learning projects.

1	2	3	4	5	6	7
strongly disagree						strongly agree

6. I have found the monthly seminars to be an enriching experience.

1	2	3	4	5	6	7
strongly disagree						strongly agree

7. I feel that the monthly seminars have assisted in my own professional growth and development.

1	2	3	4	5	6	7
strongly disagree						strongly agree

8. The monthly seminars have provided me with an increased understanding of the diverse approaches to cross-cultural studies.

1	2	3	4	5	6	7
strongly disagree						strongly agree

9. The monthly seminars have enhanced my understanding of the culture concept.

1	2	3	4	5	6	7
strongly disagree						strongly agree

10. I have found the monthly seminars to be useful in developing a common language that will assist in linking the various courses in the cross-cultural curriculum.

1	2	3	4	5	6	7
strongly disagree						strongly agree

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Please answer the following questions in the spaces provided (Please use a separate sheet of paper if more space is required for you comments).

1. Briefly describe what you feel are the major strengths of these seminars.

2. Briefly describe what you feel are the major weaknesses of these seminars.

3. Briefly provide suggestions for improvement in the monthly faculty seminars.

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Mean ($\bar{X}$) Responses to the Multiple Alternative Items

Item 1: 6.57

Item 2: 6.57

Item 3: 5.43

Item 4: 6.00

Item 5: 6.36

Item 6: 6.00

Item 7: 6.00

Item 8: 6.17

Item 9: 6.00

Item 10: 5.86

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Cultural Knowledge Questionnaire

Name _____

Major Curriculum _____

Cross-cultural studies curriculum (please check the one that applies): concentration ____ minor ____

How many course have you taken in the cross-cultural studies program? _____

Please list the courses you have taken in fulfilling your cross-cultural studies concentration/minor.

Course Number	Course Title
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Please answer the following statements indicating whether you believe that the statement is True (T) or False (F).

1. ____ Culture is a holistic term which includes the social and political organization, and religion of a people.

2. ____ Although the United States has a clearly defined culture, the cultures of most other countries are fragmented and somewhat idiosyncratic.

3. ____ Many languages are written backwards.

4. ____ A good understanding of American culture provides the main basis for understanding cultures around the world.

5. ____ Cultures can be said to evolve to the degree that their technology is developed.

6. ____ A good place to build hydroelectric dams and mining projects is the tropical rainforests, since no one lives there anyway and therefore, damage to local cultures will be minimized.

7. ____ If western countries could convert the rest of the world to christianity, everyone would be much better off.

8. ____ Certain religious sects who refuse to salute the flag should be forced to conform to such a patriotic action.

9. ____ America may not be perfect, but the American way has brought us about as close as human beings can get to a perfect society.

10. ____ Culture may change as a result of new developments internal to a given culture.

11. ____ A member of a particular ethnic group can have multiple cultural identities.

12. ____ Some countries have more culture than others.

13. ____ Societies that have more technology are higher cultures.

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14. ____ The miracle seeds of the Green Revolution increase grain yields and therefore are the key to ending world hunger.

15. ____ In order to operate successfully in a global society, we need to encourage people to conform to a uniform culture.

16. ____ The major reason for poverty in some cultures is that their inhabitants lack the basic values and intelligence necessary to change their situation.

17. ____ Since stereotypes are learned behavior, removing them through educational programs should be relatively easy.

18. ____ American commitment to progress is an indicator of its cultural superiority.

19. ____ An external event, such as a natural disaster, may result in cultural change.

20. ____ Rensselaer Polytechnic Institute is an example of a diverse culture.

Please answer the following multiple choice questions by choosing the BEST alternative.

1. Compared to the culture of North America, Latin American culture:

   a. tends to be somewhat idiosyncratic.
   b. is more complex.
   c. places greater emphasis on personal relationships.
   d. is more fragmented.
   e. both a and d

2. Which of the following is NOT characteristic of the culture concept?

   a. Culture is inborn.
   b. Culture is dynamic and changes over time.
   c. Culture is shared.
   d. Culture includes the religious practices of a people.

3. Which of the following statements concerning the concept of culture is TRUE?

   a. There are cultures today that are replicas of Stone Age cultures.
   b. Culture is an acquired characteristic.
   c. Some countries have more culture than others.
   d. Societies that have more technology are higher cultures.

4. The term "cultural diversity" refers to:

   a. differences between people from different countries.
   b. differences between people within countries.
   c. differences between ethnic groups within the Unites States.
   d. a and b.
   e. all of the above.

5. Stereotypes exist because:

   a. most of them are accurate depictions of individuals in the stereotyped group.
   b. they can be used to accurately predict the behaviors of an individual in the stereotyped group.
   c. they can be used to better understand individuals in the stereotyped group.
   d. none of the above.
   e. all of the above.

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6. Which of the following statements concerning the definition of culture is TRUE?

   a. Culture may change as a result of new leadership within a country.
   b. Culture refers only to those activities of a people that differentiate them from other peoples.
   c. Culture is a specific term which refers strictly to the values held by a group of people.
   d. Culture is static and remains unchanged over centuries.
   e. Both c and d are true.

7. William Chan is an Asian American. Which of the following statements about him is likely to be TRUE?

   a. He will excel in subjects such english and history.
   b. He will excel in subjects such as math and science.
   c. He will excel in all subjects, regardless of the specific discipline.
   d. Unable to determine from information given.

8. In order to operate successfully in a global society:

   a. we need to ignore differences among people and focus on similarities.
   b. we need to encourage people to conform to a uniform culture.
   c. we need to establish less ambiguous guidelines for acceptable behavior.
   d. b and c.
   e. all of the above.
   f. none of the above.

9. Rensselaer Polytechnic Institute is an example of an entity that:

   a. has many subcultures.
   b. has a relatively homogeneous culture.
   c. has many ethnic groups but only one culture.
   d. cannot be defined in terms of culture.

10. When culture changes, it is likely to be the result of:

   a. a war.
   b. new developments internal to a given culture.
   c. natural disasters.
   d. any of the above could result in cultural change.
   e. none of the above, cultures do not change.

11. All of the following statements concerning culture are true <u>EXCEPT</u>:

   a. The study of culture reveals that assigning women a subordinate role in society is commonplace.
   b. Conflict between cultures could be reduced by American intervention aimed at making cultures more similar.
   c. Culture is a complex concept.
   d. The commonly shared values held by employees in an organization would be an example of culture.

12. The production of culture is:

   a. socially organized
   b. conditioned by political conditions.
   c. conditioned by economic conditions.
   d. intimately connected with power.
   e. b and c.
   f. all of the above.

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13. The cultural study of science would emphasize:

a. the uniqueness of scientists and scientific works.
b. the social processes involved in producing science.
c. comparisons with other types of social organization.
d. b and c.
e. none of the above.

14. The meanings of "female" and "male:"

a. change over time in particular cultures.
b. vary from one culture to another.
c. are the same in all cultures.
d. are synonyms for "feminine" and "masculine."
e. a and b.
f. none of the above.

15. The concept of culture, as used in the cross-cultural studies program, would not include:

a. religion, the arts, ideas.
b. social structure and institutions.
c. the economy.
d. buildings.
e. the natural environment.
f. just ideas about the natural environment.

16. _____ can safely be said to transcend human culture.

a. Computers
b. Newton's law of physics
c. The theorems of calculus
d. Theories of society
e. b and c only
f. None of the above
g. All of the above

17. Which of the following is **NOT** a component of culture?

a. Culture is both learned and inherited.
b. Culture is patterned or structured.
c. Culture includes both ideas and institutions.
d. Culture includes tools.

18. Science and technology:

a. are developed by international scholars who can be described as cultureless in their research.
b. are embedded in culture.
c. have their own culture and are, therefore, independent of ethnic cultures.
d. are the indicators of societal progress.

19. The failure of technology transfer is most often due to:

a. the ineffective functioning of the technology.
b. the lack of a compatible cultural context.
c. human incapacities.
d. insufficient public relations work.

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20. The 16th century decision by the Japanese to give up the gun is an example of:

a. rejection of militarism.
b. lack of skilled personnel to handle a new technology.
c. fear that a new technology would undermine society.
d. taboo against gunpowder.

21. When it is said that "India's culture is ancient," what is meant is that:

a. Indians are living in the past.
b. India has not adopted modern science and technology.
c. India's music and arts haven't changed over the centuries.
d. India has a long cultural history.

22. When people understand each others' cultures,:

a. they will have a better understanding of why others do what they do.
b. there will be peace in the world.
c. competition between people will end.
d. both b and c.

23. "Cultural relativism" refers to:

a. a society in which each member is related to all the others.
b. a method for interpreting ideas and actions relative to the framework of a given sample.
c. the idea that all people within a culture are morally homogeneous.
d. a method for relativizing all value judgments.
e. both b and d.

24. Culture is a concept which includes:

a. social, economic, and political organizations.
b. religious ideas.
c. values and traditions.
d. all of the above.

25. Culture is:

a. inborn.
b. social.
c. unchangeable.
d. idiosyncratic.

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APPENDIX E

Evaluation Instrument
Cross-Cultural Concentration

Instructions: The following questionnaire was developed to assess your reactions to your participation in the cross-cultural concentration. Please complete both the multiple-alternative items (items 1-9) and the open-ended items (items 10-12) as well as the course identification section (item 13).

Read each item carefully and use the following scale to indicate the extent to which your agree or disagree with each of the statements: 1 = strongly disagree; 2 = disagree; 3 = somewhat disagree; 4 = neither agree nor disagree; 5 = somewhat agree; 6 = agree; 7 = strongly agree

_____ 1. My participation in the cross-cultural program improved my understanding of the meaning of "culture."

_____ 2. As a result of my participation, I have gained a better understanding of the basic characteristics of a global society.

_____ 3. My participation in the cross-cultural program improved my understanding of the meaning of the term "cultural diversity."

_____ 4. I now have a better understanding of the importance of culture in the context of science and technology as cultural processes.

_____ 5. I feel that this program has increased my sensitivity to cultural issues.

_____ 6. I feel that the information gained from this program will make it easier for me to interact with people from diverse cultures.

_____ 7. As a result of this program, I feel that I have a better understanding of the different value systems under which different cultures operate.

_____ 8. As a result of this program, I feel that I will be more able to approach problems from a perspective that takes cultural differences into account.

_____ 9. Overall, I think that participation in this program is a worthwhile experience.

10. Please describe the major strengths of the cross-cultural concentration.

11. Please describe the major weaknesses of the cross-cultural concentration.

12. Please provide any additional comments concerning the program that you feel would be useful.

Course Identification Section

13. **Please list the courses you have taken to fulfill the requirements for the cross-cultural concentration.**

Course Number	Course Title

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Cross Cultural Studies in Science and Technology

Student Exercise - Beginning of Program

Purpose

You have enrolled in one or more of the courses included in the Cross Cultural Studies in Science and Technology program at RPI. We ask your help in an evaluation we are doing of that sequence of courses. Specifically, we ask that you participate in a short written exercise now and again toward the end of your coursework. We are not evaluating you. However, it is extremely important that you take the exercise seriously and do your best work.

Instructions

Graduates of RPI often encounter situations in which technical issues must be addressed within a complex framework of social and cultural sensitivities. At the beginning of the semester, you prepared a written response to the scenario presented below which illustrates such a situation. Please review your earlier response (attached). Then, prepare a further written response to the Team Leader's request. This can take the form of either an elaboration or modification of your earlier response or a new memo. In preparing your response, draw on what you know about the concepts of culture and power as they are related to science and technology. Develop your response as fully as possible within the time available. This exercise is intended to take about an hour, though you may take more time if you wish.

Scenario

Nesoto is a poor, mountainous, Third World country. Eighty percent of the population live in small villages, dispersed over the mountainsides. Given the terrain, the national transportation system is limited, as is people's mobility--most people live their entire lives close to the village in which they were born. Access to education is limited and, for those who do gain access, the education they receive is poor, though efforts have been made in the last five years to strengthen it. One of the problems facing the country is deforestation, largely a result of rural inhabitants using the available trees for firewood. The deforestation has led to soil erosion, which has negatively impacted farming (which is still the livelihood of most rural villagers).

UNICEF is interested in undertaking a 5 year, $5 million project to introduce locally adaptable technology to the rural areas, particularly technology aimed at raising the standard of living. Specifically, they want to start a series of small businesses that will build a special (highly efficient) stove that uses animal dung as fuel. The stoves can be manufactured in-country and assembled on site. This stove project is expected to improve nutrition, reduce the pressure for firewood, and provide some income for local manufacturing companies.

However, before proceeding with this project, both the Government of Nesoto and UNICEF want to think through the issues they may encounter in implementing a project of this type. You have been asked to help in this planning effort.

While the UNICEF Team Leader is impressed by your credentials, it is also clear that you have little or no experience in conducting a study of this type. But not to worry. As part of planning for this study (and as a basis for deciding who will be on the team), you have been asked to draft a two page memo outlining (a) how you would approach such a task and (b) some of the issues that you think are important to address in the study.

Cross Cultural Studies in Science and Technology

Student Exercise - End of Program

Purpose

You have enrolled in one or more of the courses included in the Cross Cultural Studies in Science and Technology program at RPI. We ask your help in an evaluation we are doing of that sequence of courses. Specifically, we ask that you participate in a short written exercise now and again toward the end of your coursework. We are not evaluating you. However, it is extremely important that you take the exercise seriously and do your best work.

Instructions

Graduates of RPI often encounter situations in which technical issues must be addressed within a complex framework of social and cultural sensitivities. At the beginning of the semester, you prepared a written response to the scenario presented below which illustrates such a situation. Please review your earlier response (attached). Then, prepare a further written response to the Team Leader's request. This can take the form of either an elaboration or modification of your earlier response or a new memo. In preparing your response, draw on what you know about the concepts of culture and power as they are related to science and technology. Develop your response as fully as possible within the time available. This exercise is intended to take about an hour, though you may take more time if you wish.

Scenario

Nesoto is a poor, mountainous, Third World country. Eighty percent of the population live in small villages, dispersed over the mountainsides. Given the terrain, the national transportation system is limited, as is people's mobility--most people live their entire lives close to the village in which they were born. Access to education is limited and, for those who do gain access, the education they receive is poor, though efforts have been made in the last five years to strengthen it. One of the problems facing the country is deforestation, largely a result of rural inhabitants using the available trees for firewood. The deforestation has led to soil erosion, which has negatively impacted farming (which is still the livelihood of most rural villagers).

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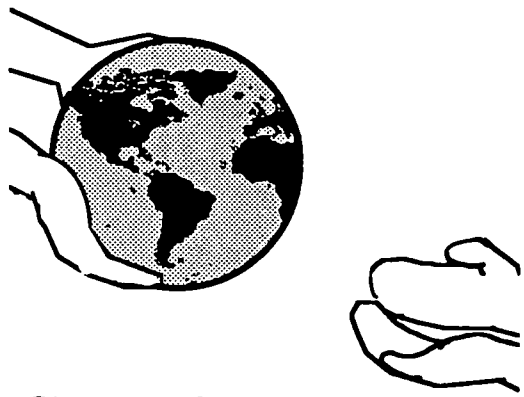
Rensselaer

School of Humanities and Social Sciences



Cross Cultural Studies of Science and Technology

A
Rensselaer Polytechnic Institute
Project
Funded by FIPSE

Globalizing Education for Engineering and Science Students:

A FIPSE Project Model for *"Cross-Cultural Studies of Science and Technology"* Final Report

School of Humanities and Social Sciences
Rensselaer Polytechnic Institute
Troy, NY 12180

Overview Funding from the Fund for the Improvement of Postsecondary Education, (FIPSE) of the U.S. Department of Education (Grant # P116B10737) has enabled Rensselaer Polytechnic Institute to develop an undergraduate minor and a three-course concentration in *Cross-Cultural Studies of Science and Technology*.

Primary Objective The primary objective of the project was to develop a minor and three-course concentration to give students a cross-cultural understanding of science and technology through courses on world cultures and the world system as well as specific courses on science and technology in different cultures.

Need for Project In the global society in which we live the ideas and technological artifacts that engineers and scientists produce move across national borders and diffuse through cultures with astonishing rapidity, and the scientific world view increasingly defines the outlook and aspirations of people around the world. Yet in the rigorous process of acquiring and maintaining the requisite skills for a technical career, scientists and engineers typically have little chance to investigate and understand the social and cultural dimensions of their work. Institutions such as Rensselaer educate the people whose scientific ideas and technological innovations help shape the globalization process. *They must also provide their students with a broad understanding of cultural values and processes enabling them to overcome cultural barriers in order to serve human needs worldwide.* The program's focus on cross-cultural studies is designed to use humanities and social science studies to give engineering and science students a global worldview that sees the inter-relatedness of the technical and social in some of its main cultural forms.

A Model Curriculum Because this cross-cultural science and technology program meets an important need of science and engineering students being educated to live and work in a global environment without adding additional burdens on students and without requiring significant additional resources, it may well serve as a model for other universities that wish to develop multicultural curricula in their engineering and science programs.

Curriculum Development

The Faculty The faculty who have developed new courses and revised existing courses and who serve as advisors to the students in the program are drawn from anthropology, archaeology, economics, history, philosophy, and sociology.

Faculty Seminars To begin the process, faculty participated in a number of seminars during the first year in which each member of the committee made a presentation on their area of expertise relevant to the project. The discussions aimed at creating a shared understanding of key concepts. In the second year outside experts gave seminars and lectures. In the third year, the project faculty presented a series of lectures to the university community.

Film Series As part of the publicity for the program, the faculty also offered a one-credit mini-course titled "World Cultures Through Film." The course consists of a weekly film with each faculty member introducing the film and leading a discussion after the film. (Subsequently, the film series has been folded into the Introduction to Cultural Anthropology course.)

Courses Many existing courses were appropriate without modification. For example, "Cross-Cultural Perspectives on Science and Technology." This intermediate level course has five main components: multicultural aspects of the history of science and technology, intercul-

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ral communication in technical settings, medical pluralism d Non-Western medicines, technology and development, d policy issues.

me existing courses were modified. For example "Modern tin America," a broad survey course, has been changed to clude sections on science, technology, and development. ecific issues include development projects in the Amazon, chnology and indigenous peoples, technical aspects of the ug war, and environmental issues related to NAFTA. This del may be the most realistic for colleges that already have bstantial offerings in area studies courses. One needs only convince a core group of faculty who teach those courses to ake some modifications and the college is well on its way to minor.

me new courses devoted specifically to science and tech- logy issues in different areas of the world were added. For ample, "Science, Technology, and Values in India" an erdisciplinary course taught by an economist and a philoso- er, examines the relationship of cultural values to science d technology in India. "Science and Technology in the Arab orld" and "The History of Japanese Industries" are other amples of new courses.

Structure of Concentrations For the three course ncentration a student selects at least one course from a oup of courses that introduces students to the concept of lture and involves significant cross-cultural comparisons; least one course from a group of courses that focus on ience and technology in diverse cultural context; and not ore than one course from a group of courses that have a gnificant comparative or cross-cultural focus (the yellow ochure lists these three groups of courses as well as rationeal d objectives of the concentration).

Structure of the Minor The minor consists of five ee-credit courses. No more than one course can be at the 0-level (first-year level). Courses are divided into two main oups. Group A is a core group of courses that are about ence and technology in different cultural contexts. At least o courses must be from that group, but up to four courses ay be from that group. Group B is a group of related courses different cultures of the world. Upper-level language urses that have significant social/cultural content are in- ded in that group. Group B is drawn from the existing rriculum. No more than two courses may come from Group (See the attached blue brochure titled "Minor" for more formation.)

The fifth course, the minor capstone, is an experiential learning project that provides students hands-on, real-life experience with an ethnic or national group different from their own. Examples include working in a local Latino community center or participating in a conversational partners program for students with English as a second language. Students also complete a list of readings and to write up a short report about their experience. Both the three-course concentration and the minor in cross-cultural studies of science and technology fulfill a depth requirement in the humanities and social sciences required of all Rensselaer students.

Abstracts of Syllabi

General Surveys. For the survey course "Cross-Cultural Perspectives on Science and Technology," Hess has developed the introductory book *Science and Technology in a Multicultural World: The Cultural Politics of Facts and Artifacts* (forthcoming from Columbia University Press). The book is accessible for undergraduates who have had at least one semester of a general STS course, preferably at least two semesters. Chapter titles are as follows

1 Introduction
2 The Cultural Construction of Science and Technology
3 The Origins of Western Science: Technototems in the Scientific Revolution
4 Temporal Cultures and Technoscience
5 The Social Relations and Structures of Scientific and Technical Diaspora
6 Science and Technology at Large: Cultural Reconstruction in the Broader Society
7 Other Ways of Knowing and Doing: The Ethnoknowledges and Non-Western Medicines
8 Cosmopolitan Technologies, Native Peoples, and Resistance Struggles
9 Conclusions: Science, Technology, and the Multicultural Education

That course also uses as a reader Sandra Harding's *The Racial Economy of Science.*

Latin America. For the Amazon and development, there are a number of books that have a substantial discussion of science and technology issues. For example Andrew Revkin's *The Burning Season* and Susanna Hecht's and Alexander Cockburn's *Fate of the Forest*. Simon Schwartzman's *A Space for Science* and Jacqueline Fortes's and Larissa Lomnitz's *Becoming a Scientist in Mexico* are also recommended. Mov-

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ies and articles by Terence Turner on the Kayapó and technology provide a good example of how indigenous peoples can use technology in their struggles for self-determination.

Africa. We have used Sam Bass's *Camping with the Prince and Other Tales of Science in Africa* as a successful, although journalistic, account of issues related to doing science in Africa. Essays on science in Africa and other world regions also frequently appear in the journal *Minerva*. We have also done sections on the !Kung bushpeople and development, with classroom activities involving a comparison of the movies "The Gods Must be Crazy" and "!Nai." Our school does not have an Africanist, and as a result our curriculum development has been weak in this area.

South Asia. Readings used include the following: John M. Koller, *The Indian Way;* Romesh Diwan and Dennis Livingston, *Alternative Development and Appropriate Technology*; Dharamapal, *Indian Science and Technology in the 18th Century*; Susantha Goonatilake, *Aborted Discovery: Science and Creativity in the Third World*; Ashis Nandy, *Science, Hegemony, and Violence*; Svami Staya Prakash Sarasvati, *Founders of Sciences in Ancient India.*

China. Readings on China include: L. Stover, *The Cultural Ecology of Chinese Civilization*; S. Nakayam and N. Sivin, *Chinese Science*; Li Yan and Du Shiran, *Chinese Mathematics*; S. Restivo, "Joseph Needham and the Comparative Sociology of Chinese and Modern Science," in *Research in Sociology of Knowledge, Sciences, and Art: Vol. 3.* (Currently titled *Knowledge and Society*); and Needham/Ronan, *The Shorter Science and Civilization in China.*

Japan. Readings for "The History of Japanese Industrialization" include as required texts Michael Barnhart, *Japan Prepares for Total War*; and Chalmers Johnson, *MITI and the Japanese Miracle.* On Noel Perin's *Giving up the Gun*, see the review by Noel Totman in *Journal of Asian Studies*, 1980, 39 (5): 599-601.

Middle East. Required texts for the course on "Science and Technology in the Arab World" include *Home and Homeland*, by Linda Layne; *Architecture for the Poor*, by Hassan Fathy; *The Need for a Sacred Science*, by Seyyed Nasr; "Health and Politics" (MERIP Report No. 161); and *Science: The Islamic Legacy* (*Aramco World* magazine reprint).

Evaluation

Three evaluation instruments are administered to the students in addition to individual course evaluations, which are administered through the departments.

1. The Student Exercise involves a case study in which students are asked to read a short description of a development scenario and to write up what they think should be done. The student response is evaluated by a faculty committee according to a shared rating scale. At the end of the five-course sequence in the minor, students must review their original response and write up how they would change their original response, if at all. Again, that review essay is evaluated by a faculty committee according to a shared rating scale.

2. A second instrument, which is administered annually, consists of a multiple-choice questionnaire that evaluates students' knowledge about the culture concept and their attitudes regarding multiculturalism and ethnocentrism.

3. A third instrument, which is also administered annually, is a student evaluation of the courses and the program in general.

For More Information

A packet of additional information including brochures for the minor, three course concentration, and experiential learning project, evaluation instruments and selected syllabi, is available for a fee of $5.00 (to cover duplicating and mailing costs). Please contact:

Frances Anderson
Administrative Assistant
Department of Philosophy, Psychology, and Cognitive Science
Sage Building
Rensselaer Polytechnic Institute
Troy, NY 12180-3590

For Help In Setting Up a Program

If you wish to discuss setting up a program at your institution, and have additional questions, please contact either David Hess, FIPSE Project Co-Director, STS Dept., Sage Building, RPI, Troy, NY 12180-3590. Phone: (518) 347-0355 or email hessd@rpi.edu. or John M. Koller, FIPSE Project Director, Philosophy, Psychology and Cognitive Science Department, Sage Building, RPI, Troy, NY 12180-3590, Phone (518) 276-6526 or email koller@rpitsmts. You may also wish to contact FIPSE directly in Washington, D.C., for a copy of *Lessons Learned from FIPSE Projects* and *Program Book Project Descriptions.*

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