INSTITUTE FOR THEOLOGICAL ENCOUNTER WITH SCIENCE AND TECHNOLOGY

BULLETIN

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We feel that the beginning of the academic year is an appropriate time to publish the important surveys of Dr. Charles Ford on the relationship between faith and science on the campuses of church-related colleges and universities. What is labelled Part Two in the Ford survey was prepared for the ITEST Workshop on Science and Technology Education in Church-related Colleges and Universities, held in St. Louis in October, 1989. We are re-publishing Dr. Ford's survey and reflections again for comparison with the present survey.

My own "Reflections" (p. 33ff) should not be interpreted as a radical change in ITEST's work. Evangelization has always been an ITEST objective. We are simply hoping to give it more prominence. Also, we do not intend to curtail any of our present ways of doing things. We are seeking greater clarity about the faith/science enterprise and about the needs of the Christian churches in this effort. We shall welcome any and all reactions both to Dr. Ford's survey and to my reflections. We seek truth and clarity (as best we sinners can attain either), not ideological purity.

Also, in the announcements, we mention a convention-type meeting we'd like to hold in August of 1993. Place: Holyoke, Massachusetts. Details of this proposed meeting will be sent to each of you in the Membership renewal letter in October. We ask you to reply to the questions about your possible attendance. We would like to bring as many members of ITEST as possible together for that convention — **1993 is the 25th anniversary of ITEST's legal incorporation.**

I wish each of you success and God's gracious presence.

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ANNOUNCEMENTS

1. All the dues-paid members should have received the Proceedings of the March, 1991 Workshop on *Some Christian and Jewish Perspectives on the Creation*. These were mailed in the middle of August. Extra copies are available at discount ($9.95) from ITEST.

2. As we announced at the March Workshop, there is no meeting scheduled for March, 1992. Increased costs (especially travel and the cost of meeting facilities) have made it difficult for people to attend two meetings each year. Spring was chosen as the meeting to be dropped because calendar conflicts seem to occur more often in March than in October. We hope to be able to send each dues-paid member a copy of a book now being prepared on the role of scientists in the mission of the church. It is being written by Dr. Eva-Maria Amrhein, a solid-state physicist from Germany, and Father Robert Brungs. Currently, the second draft is being critiqued by several scientists. We hope to have it finished, printed and mailed by March or April. Collaborating at a distance of several thousand miles is a slow process.

3. The Board of Directors has decided that the October, 1991 Workshop will address the question: "Is Technology Out of Control?" We hope to have four to six essayists treat various aspects of this question. We shall report progress on this meeting as details become available. Our European members in particular -- but not exclusively -- seem very interested in this set of issues.

4. ITEST has established contact with faith/science groups in Bulgaria and Russia. As these contacts develop we shall report on them in the Bulletin.

5. In the summer issue of the Bulletin we reported that, at the request of a few of our members, ITEST co-sponsored a Symposium on the Shroud of Turin. We also reported that the staff had agreed to format the publication of the papers and that we hoped to have this task completed by early in fall. That estimate must be radically revised. Three months after the meeting we have not received one-third of the papers. Because of the number of slides involved in each paper, we can do them only one at a time. They are too long to store on the computer (upwards of 30 - 40 megabytes). They must be done and printed one at a time. We cannot make an estimate of when this volume will be done.

5. The results of the study on sci/tech education in Church-related colleges and universities motivate us as ITEST members to become more involved in this important integration of science and faith in our lives. One way that we can begin this integration is by recruiting new members. Any real increase in membership depends on each of you. We have observed over the years that membership gained through various kinds of advertizing is unstable compared to that gained by the personal recruiting of the membership. We would like to know the names and addresses of your friends and colleagues whom you think might be interested in membership. Better, you might mention ITEST to them. We can supply you with brochures. May we be presumptuous enough to remind you of your baptismal obligation to be an apostle? Insofar as ITEST is a modest means of spreading the Good News, responding to this request may be a small step in fulfilling that obligation.

6. Finally, a reminder that October, 1993 is the 25th anniversary of ITEST's legal incorporation as a not-for-profit corporation. We have lived that designation well — by never having a profit. As noted in the Director's message, we are planning a convention-type meeting for early August, 1993. You will be asked soon whether you would be able to attend such a meeting. The Board has tentatively agreed on the topic of beauty in science, technology and faith as a suitable theme for this meeting. We would like to make this a celebration for the whole membership and their families, if possible. If there is enough interest in this anniversary project, it will be held in Holyoke, Massachusetts either the first or second week in August, 1993.

UNDERGRADUATE RELIGIOUS STUDIES/THEOLOGY AND SCIENCE IN CHURCH RELATED COLLEGES: INTEGRATION AND SEPARATION

Charles E. Ford, Ed.D., Dean, Graduate School of Basic Medical Sciences, New York Medical College, Valhalla, New York

"Joy and amazement at the beauty and grandeur of the world of which man can just form a faint notion," Albert Einstein. That quote aptly summarizes this study of the integration or separation of science and theology curricula at 720 church related colleges (CRC) and 80 independent institutions founded as CRC's. This report summarizes the CRC religious studies/theology chairpersons' responses to questions designed to determine the current relationship between theology and the sciences on their campuses as represented in curricula, courses and shared instructional goals.

Science and theology are perceived as antagonistic disciplines. Commonly this is tied to the Galileo (1633) affair. Prior to Galileo, science and theology were perceived as distinct but mutually respectful approaches to truth: empirical science was seen as a rational science, theology as a revelatory science. Galileo himself stated: "the authority of the Sacred Scriptures has as its sole aim to convince men of those truths which are necessary for their salvation. . . . But that the same God who has endowed us with senses, reason and understanding should not wish us to use them and should desire to impart to us by another means knowledge which we have it in our power to acquire by their use -- this is a thing which I do not think I am bound to believe."

Historians of science delineate at least four approaches to the relationship between science and theology. The first, *subsumption*, is the supremacy of theology over the physical and the biological sciences which served to support theological truths. Second is *separation*. This reflects the period when scientists were convinced that natural causes in the physical and in the biological universe represented a self-contained universe distinct and perhaps unconnected to a Supreme Being.

Separation led to *alienation* in the 19th century, exemplified by the followers of Darwin vs members of religious bodies. A notable exception was John Henry Cardinal Newman whose dedication to truth as presented in his great essay "Christianity and Scientific Investigation," in *The Idea of a University*, argues for bridges between disciplines. This was not a popular religious position during his time. In North America, Andrew Dixon White, first President of Cornell Univ., provided a commanding case for the rationale of separation and the necessity of alienation in his monumental *History of the Warfare of Science with Theology in Christendom*. He said the disciplines were enemies, only one of which was capable of seeking truth. Science vs theology became the cult nurtured by secular utilitarianism and pragmatism in America. John Dewey's 1934 Terry Lectures at Yale defined the terms of the relationship between science and theology for most of this century.

Today more open, or at least *concurrent*, approaches to a relationship of the universe to a Supreme Being appear to be emerging. They are cautiously explored by Hawking in *The History of Time,* the most popular among many dealing with cosmology. Religious questions can now be investigated by scientists; scientists and theologians are gradually coming to respect each other's approaches to the questions of the origins and mechanisms of life and the universe. Theologians and scientists ask each other what they do, how they do it and where they are going. Ted Peters' "Scientific Research and the Christian Faith," in *Thought,* Mar, 1991, offers a useful update on this process.

The astounding data and theories emerging from the astronomical sciences may lead to a new cosmology. How are CRC's, founded to prepare clergy and to educate lay men and women for the professions, citizenship and the work of their respective denominations, meeting this remarkable shift in the pursuit of truth, the goal of learning?

To pursue this question properly, we should first review the literature relevant to CRC's. Manning M. Pattillo, Jr. and Donald M. Mackenzie's Danforth Commission's report, *Church Sponsored Higher Education in the United States,* published in 1966 by the American Council on Education, is still the landmark description of CRC's. Their comments reflect the impact of alienation:

> First, something serious has happened to teaching and learning in the liberal arts. Critics have been saying this for a long time --

> perhaps it has been said so often that it is no longer heard. Under the influence of ideas inimical to the humanities tradition liberal education has lost a clear sense of purpose and therefore of unity. . . .
>
> Second, religiously, the Church colleges are in a difficult position. The academic world today is essentially a secular world. Religion has been under attack or suspect by intellectuals for several generations. Probably no contemporary institution, however strong its religious foundation, can wholly escape the inroads of secular thought. These subtle influences might be expected to weaken the religious convictions of faculty and students and thus undermine the very principles that could unify Church institutions.

Pattillo and Mackenzie quote the Harvard Report, *General Education in a Free Society,* 1946: "religion is not now for most colleges a practicable source of intellectual unity." They conclude their somber essay noting that the private sector, specifically CRC's, play an increasingly minor role in American higher education.

Recent literature on American higher education describes a situation perhaps more dismal than at any time in our history. Next to the technical and quantitative reports which lack the breadth or insight provided by Pattillo and Mackenzie, are condemnations of the malaise undermining the vision and purpose in American higher education. They especially score faculty responsible for, but apparently disinterested in, undergraduates and undergraduate curricula or who reject traditional disciplines preferring to pursue special interests.

Universities are fragile, as is civilization. They are always at risk from totalitarian ideas, governments and politics, egos and emotions. Within the university there is a constant battle between truth and freedom, and the latest version of the big lie: deconstructionism, narcissism, intolerance, the closing of debate, and now "political correctness." The alleged battle for the control of American universities is amply described in *The Closing of the American Mind, Profscam, The Hollow Men, Liberal Education: The Policies of Race and Sex on Campus* and even the usually uplifting reports of the Carnegie Foundation.

Equally threatening to the university are entrepreneurs whose motives, concerned with control of the biotechnology industry, threaten to weaken the pursuit and integrity of science on their campuses. As this is written, (4/91), a tragic story of deceit and obstruction is unfolding at the highest levels of American science. If academe is to move curricular and instructional issues to the forefront, exploring the immense potential and necessity for relating the theological disciplines to the content and conduct of science, this is the time to do so.

In 1990, ITEST reported on CRC's and the preparation of scientists in *Science/Technology Education in Church-Related Colleges and Universities.* That report, based on ITEST's conference of Oct. 1989, generated this study. The '89 study captured the perceptions of the integration of science and theology on Church related campuses as seen by Chairpersons of science departments. The conclusions related in that study are reaffirmed by the data in this assessment of the relationship between theology and science in CRC's in general and on their campuses by the Chairs of religious studies, religion or theology departments. The research instrument was developed by a group of ITEST theologians, scientists and educators, one of whom, Joseph Grau, Prof. of Religious Studies at Sacred Heart University, Fairfield, Ct, died in April, 1991. His contribution, especially on our responsibility for the environment and the avoidance of war, is referenced in the research instrument.

In 1985, the U.S. Department of Education counted 66 denominations enrolling 1,042,012 students in 786 institutions. This is 8.0% of total college enrollment and 23.2% of all American colleges and universities. For this study, related denominations were placed in one category, i.e. Baptist, etc. Seven hundred and twenty Church related colleges, plus 80 institutions of higher education in States requiring all private institutions to define themselves as independent to receive State aid, comprise the basis of the project. One hundred and sixty-three (20.3%) of the 800 polled responded. The distribution by denomination is: Baptist 27; Catholic 52; Evangelical/Pentecostal 21; Lutheran 15; Methodist 16; Presbyterian 12; and Protestant 20.

Given the highly positive data recorded in the responses to specific questions on curricula and instruction, institutions offering courses and a curriculum with an academic relationship between theology and science likely constitute the responding group. Non-responding institutions may well be

the colleges and universities described in Pattillo and Mackenzie which may be unwilling to treat the relation between science and theology. Is survival of the institution's traditional mission the issue, as a recent National Academy of Sciences meeting (Project Kaliedascope) reported? The struggle in many private colleges, including CRC's, is keeping the sciences alive. For them, integration with other disciplines is a luxury. Alternatively, is the integration of knowledge a matter of concern or a priority? Must students and faculty collect the curricular *parts* into their own schema as they move toward graduation? This has been the condition in American higher education for most of this century.

We are not surprised, only disappointed, in the lack of responses and the absence of data and insight that might have been provided by institutions unable or unwilling to pursue integrative curricula in the way inferred in the research instrument. The missing 80% may be attributed to a rejection of the premise that science and theology can be integrated in undergraduate curricula, the questionnaire, lack of time or lost questionnaires.

We might ask if church related College theology Chairs are believers and scholars, or scholars only, approaching their disciplines as humanists or anthropologists. If so, they are out of the mainstream, since recognition of common ground between science and theology is emerging from numerous sources. In a recent *Hastings Report,* Daniel Callahan suggested that biomedical ethics would profit from a return to its long neglected theological roots and that the departure of theologians from investigation of biomedical ethical questions has plunged such issues into the courts and legislatures to the loss of humane dimensions of biomedical and ethical questions. Albert Jonsen's "American Moralism and the Origin of Bioethics in the United States," in *The Journal of Medicine and Philosophy,* supports Callahan with an analysis of Puritanism and Jansenism in the history of American religion. Jonsen's article does not deal with church related colleges. To understand such institutions one must understand the interrelationship between moral absolutes, college curricula, courses and pedagogy. The late Walker Percy and Oliver Sacks, both physicians, entered the metaphysical through science. This is a brief but clear indication that Church related colleges ought to address very directly the potential of theological-scientific dialogue for undergraduates.

The goal of this study is to determine in undergraduate CRC curricula the relationship between science and theology (content, method, history, commonality, diversity). It looks to an awareness of parallel roads to knowledge, the basis for common (or divergent) ground between science and technology as illuminated by religious or theological insight. It seeks to learn of the commitment to asking questions *in the classroom* in the context of ethics, public policy, legal decisions and legislation. This pilot study is simple in design and execution; a polling of opinion and fact on the instructional relationship between theology, religion or religious studies and the sciences.

Section One seeks to elicit responses to questions centered on cosmological assertions. The consistently high level of responses as represented in the scale (five the highest) and the level of agreement suggests that respondents hold a unitary view of a universe that can be plumbed by scientists and theologians together (*concurrence*) as opposed to a posture of alienation. Only the potential subjection of technology (1.10) to theology/religion brought substantial disagreement.

Section Two provides a barometer of concordance between institutional mission and application of theology, religious studies and science to intellectual and career goals and values. Respondents to the nine statements suggest that CRC's were not founded *per se* to educate protestors against injustice (2.1) but to prepare graduates to analyze and engage in the application of science and technology towards goals acceptable within a faith tradition and within a pluralistic society. CRC's have the resources and can educate scientists -- a confirmation of recent studies on the high productivity of liberal arts colleges, many of which retain their church related zeal.

How do religious scholars assess from their faith tradition the importance of scientific knowledge -- critical, essential, useful, or otherwise? Question 2.8 can be a gold mine or a mine field. That only 25.6% regard knowledge of science and technology practice as critical is puzzling to this investigator. So also is the range (9.5% - 50.0%) within that group. Perhaps critical and essential are close enough, however, (combined total of 69.7%) to signify good news for the future of cosmology.

Section Three sought to measure opinions on the interface among faith traditions, CRC missions,

and specific goals of science curricula. Science Chairs responding in the first part of this study (ITEST 1990) clearly saw their mission as preparing scientists primarily within a liberal arts tradition and to a lesser extent as a CRC. Theology, Religious Study Chairs viewed science instruction with the same perspective but less so, e.g., teaching science is a component of a liberal education -- 93.5% for Science Chairs, 81.9% for Theology Chairs. A unitary view of approaches to truth expressed earlier erodes as the reality of the mission and curricular integration is revealed.

In Section Four on courses and content, the spread of responses to course requirements in religious studies/theology courses is interesting: from 76% to 8% on the number of courses required (3 or more); specific courses 100% to 44%. In a pivotal question (4.3), (science-theology integrated courses) the tilt toward integration is positive and centrist. The remainder of Section IV (4.4 - 4.10) would delight Andrew D. White. His work on the alleged transgressions of organized religion now are examined more dispassionately, we presume, in this age of concurrence, with scholars willing to evaluate estrangement, parallels, theories and methods, convergence and cosmologies from a perspective not fathomed by White's generation. An endangered planet and technology-driven life issues have changed the tune since White's day.

Section Five is constructed on two sets of issues and topics: life and the environment. Only the percentage of agreement is reported. Clearly, integration of these topics into courses is occurring. None of the topics are omitted from any of the four approaches: religious studies/theology courses; science courses; integration of science and theology in specific courses, and within other related disciplines. Is it possible that too much emphasis is placed on the integration of science, or on the topics? In a society seeking to educate citizens to understand behavioral relationships to individual and social health, holism and public policy have moved to center stage.

Our CRC respondents tell us (5.11 - 5.17) that undergraduate curricula are more current than we anticipated; this spills out of the classrooms and laboratories into extracurricular activities. Does a student activism scale of 4.7 and 96.3% level of agreement predict an emerging evangelizing generation of CRC graduates? This investigator has pursued a crooked but fruitful path which has led him to Luke 8: 4-15.

In addition to scales and percentages, there is an anecdotal record for respite and insight. Some comments, selected for their poignancy, seem to validate the underlying thesis of ITEST, encounter.

RESPONDENTS' COMMENTS:

An Iowa Catholic: "our college respects science and theology and offers them both as valid avenues to truth, beauty and goodness. We do not view these disciplines as inherently opposed and realize that we have much to offer and learn from each other. I would appreciate a chance to encourage the inter-relatedness of all approaches to truth. I think that your survey suggested that theology and science might have a difficult time living together in the same college. I would be interested in knowing the faith tradition of these who created the questions."

A Michigan Lutheran furthers the issue: "At present, we do not have courses which integrate many of the social, ethical, and scientific concerns. Each professor presents issues that relate to his/her subject matter. . . We have worked out a general studies program in which the various issues will become an integral part for study and application. In fact, many of the courses in this program will focus on such issues. In the fall of 1991 school year we will begin with this integrated approach. We look forward with anticipation to this new program, for we feel that it will go far to deal with many of the issues which we face and will face even more intensely. . . . Thank you for the opportunity to respond to the questionnaire."

Another Michigander, Dutch Reformed, "Part of our effort to integrate and deal with religion-science-technology at the general method levels and some specific issue include treating religion morally (sic) than just Christianity, i.e., some of the most powerful forms of confronting these issues begin with dualisms (including esoteric Christianity like mysticism, oriental traditions, feminist religion, etc.). One of the basic issues in the problem is the inevitable separation of dualism and the exclusive claims that inevitably follow. Your questions were difficult to answer because they are so Christian oriented. You need to move these questions to a broader religious base."

A Missouri Catholic: "Specific attempts to deal with

the faith/reason and religion/science issue are quite numerous and done in a manner which stresses the methodological autonomy each discipline requires if a viable synthesis is to be achieved."

A Massachusetts Catholic moves the topic closer to the ITEST ideal: "Among the courses we offer that attempt to integrate religion/ethics with science [are]: 'The Nuclear Dilemma' (philosophy); 'Humanities 104' (team taught) with an emphasis on the advances of science during the 19th and 20th centuries and the concomitant moral implications; 'Christian Life II'(religious studies) with total emphasis on the social implications of morality.

"A lecture series inviting a prominent speaker to address a series of medical/moral issues. As well, the college sponsors a series of talks on poverty, war, moral dilemmas in genetic engineering, etc., throughout the school year. "The college has a 'Professor Potatohead' Club that brings faculty together once a month to present papers from their various disciplines. These are often focused on the interrelationship between religion and science.

"The College has an annual *Peace and Justice* week with speakers and forums dedicated to many of the issues raised in your questionnaire."

A Wisconsin Independent Catholic "believe[s] it is important to help students explore the ethical dimensions of sciences/technology and help them develop a method of ethical reflection on these questions. However, I am not keen on attempts to 'Christianize' science/technology. Students need to appreciate the legitimate diversity in ethical views on issues of sciences and technology, while they establish their own stances based on their values and principles."

A North Carolina Methodist: "We have on our campus frequent forums in which all sorts of controversial questions, including many which appear on your survey, are debated and discussed."

A sense of loss is manifested by a *Washington State Methodist:* "I have degrees both in medicine and in theology, and most of the answers on my survey form reflect topics which I offer in my two courses 'Science and Religion' and 'Healing: A Planetary Perspective.' Our department also deals with some environmental themes in 'Professional Ethics,' which is offered jointly in Religion and Business.

"Were I to suggest to our faculty the possibility that science *might* be taught from a faith perspective, there would be a stunned silence! We do have several science teachers (now mostly nearing retirement age) whose goals mostly reflect the perspective represented in your survey. But the future probably lies with those who, like a younger physics teacher, are perplexed that people believe in God 'and all that folderol.' "Within five years no one will be doing anything which might be called 'convergence of science and theology.' History of science will be taught from a frankly secular, reductionist perspective; and environmental issues will be dealt with in a like manner. . . "I hope other colleges are on a path which is more closely linked to the Source, and I thank you for your interest in this project."

An Indiana Lutheran: "We have no courses explicitly integrating science and theology, but these topics appear in a variety of *religious* courses." And, an *Oregon Methodist,* "I do not know what you mean by 'evangelize' -- it's a loaded term to me." Another: "Although (the) University was founded by the (blank) Church and is a related institution, the teaching of religious studies is entirely from the historical and scientific points of view. Our teaching of ethics is mainly in philosophy rather than religion. We do teach philosophy of religion wherein some of the issues on the questionnaire may find some scope."

Lastly, *A Texas Protestant:* "Your survey certainly points up a glaring and embarrassing weakness in our church-related college curriculum. Part of the problem is our size. We are a very small college with limited faculty and resources. The faculty is strictly a teaching faculty with little time to do research, develop curriculum outside our specialized fields, or teach more than basic courses. . . Perhaps the other problem is related. As an instructor in religion I have a good working relationship with the faculty in the natural sciences. We do conduct joint discussions on some of the issues you mentioned. However, I do not have a strong foundation in the sciences, and the faculty in the natural sciences have had very few theology courses. We would be eager to conduct integrative courses if. . . resources and textbooks were available. If these resources are available, I would truly appreciate a bibliography to order and review."

Responses to the questions were scanned and converted into a continuum scale based on 5 as the

highest value of agreement with each statement: (5) strongly agree; (4) agree; (3) no opinion; (2) disagree; (1) strongly disagree. The five levels of responses were also combined into agree, disagree and no-opinion and are reported as percent distributions. The results are contained below.

The responses to the ITEST Questionnaire are categorized as follows:

1.0 Theology and science.

2.0 Church related colleges: religious studies/theology, science and technology.

3.0 Church related colleges: priorities and curricula.

4.0 Church related colleges: courses and content.

5.0 Church related colleges: curricula, life/environment topics and issues.

6.0 Extracurricular activities.

1.0 THEOLOGY/RELIGIOUS STUDIES AND SCIENCE

1.1 Theology, philosophy, and science within a mutually fruitful tension seek to understand the nature and purpose of the "cosmos" as an ordered and mysterious universe;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.4	96.3	--	3.7
CATHOLIC	4.7	100.0	--	--
EVAN/PENT.	4.6	100.0	--	--
LUTHERAN	4.1	93.3	--	6.6
METHODIST	4.5	100.0	--	--
PRESBYTER'N	4.2	91.6	--	8.4
PROTESTANT	4.3	85.0	--	15.0
	4.4	95.1	--	4.9

1.2 The origin of Science includes Jewish and Christian habits of inquiry, free will, curiosity and the recognition of an ordered world;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	3.7	62.9	12.2	25.9
CATHOLIC	3.5	63.5	7.7	28.8
EVAN/PENT.	4.0	80.9	4.9	14.2
LUTHERAN	4.0	93.3	--	6.6
METHODIST	3.5	68.7	--	37.5
PRESBYTER'N	4.1	66.6	--	33.3
PROTESTANT	3.8	80.0	--	20.0
	3.8	73.7	2.6	23.7

1.3 Science does not of itself supply its own direction. Theology (doctrinal and moral) can make a significant contribution to the direction of scientific research and development both on a research and application level;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.4	92.6	3.6	3.7
CATHOLIC	4.0	82.7	3.9	13.4
EVAN/PENT.	4.0	80.9	4.9	14.2
LUTHERAN	3.6	73.3	6.6	20.0
METHODIST	4.2	87.5	--	12.5
PRESBYTER'N	3.4	58.3	16.7	25.0
PROTESTANT	4.1	80.7	5.1	14.3
	3.9	80.7	5.1	14.3

1.4 Science and technology can help believers in an incarnate God better understand and develop their religious tradition;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.1	81.4	7.5	11.1
CATHOLIC	4.4	92.1	3.9	4.2
EVAN/PENT.	4.1	90.4	4.7	4.9
LUTHERAN	3.9	86.6	6.7	6.7
METHODIST	3.9	81.2	6.3	12.5
PRESBYTER'	3.8	75.0	16.6	8.2
PROTEST'NT	4.6	95.0	--	5.0
	4.1	85.9	6.6	7.5

1.5 Theologians should explore and integrate Revelation, science and technology to provide the means of discourse for Christian participation in societal discourse and decisions based on science and the application of technology;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.4	92.6	3.7	3.6
CATHOLIC	4.4	92.3	3.8	3.8
EVAN/PENT.	4.2	95.2	--	4.8
LUTHERAN	4.3	93.3	--	6.6
METHODIST	4.2	87.5	6.2	6.3
PRESBYTER'	4.5	100.0	--	--
PROTEST'NT	2.9	95.0	--	5.0
	4.1	93.7	2.0	4.3

1.6 What is learned in science and done in the technological arena has a great impact on what Christians believe and practice. These disciplines can greatly aid in the development of Christian doctrine;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	3.3	58.2	7.5	38.3
CATHOLIC	4.0	83.7	6.1	10.2
EVAN/PENT.	3.0	47.6	9.6	42.8
LUTHERAN	3.4	66.6	--	33.3
METHODIST	3.3	68.7	6.6	25.0
PRESBYTER'	3.7	83.3	--	16.7
PROTEST'NT	3.5	70.0	10.0	20.0
	3.4	68.4	5.7	25.9

1.7 The work of "secular" scientists and technologists needs and is enhanced by the participation of informed Christians as scientists and technologists;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.2	88.9	--	11.1
CATHOLIC	4.1	84.6	9.6	5.8
EVAN/PENT.	4.6	100.0	--	--
LUTHERAN	4.0	86.6	--	13.4
METHODIST	4.0	87.2	6.3	12.5
PRESBYTER'	4.0	91.6	--	8.4
PROTEST'NT	4.6	94.7	5.3	--
	4.2	89.6	3.1	7.3

1.8 Religion, the parent and beneficiary of democracy, is obliged to inform and to form the just application of science and technology;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.1	88.4	3.8	7.7
CATHOLIC	3.8	78.4	9.8	11.8
EVAN/PENT.	4.2	90.4	4.7	4.9
LUTHERAN	3.6	73.4	13.3	13.3
METHODIST	4.3	93.3	--	6.6
PRESBYTER'	3.5	66.6	8.4	25.0
PROTEST'NT	4.6	95.0	--	5.0
	4.0	83.6	5.8	10.6

1.9 Ethical issues derived from science and the application of technology are interdependent and require, to be properly understood, a worldview based on religious convictions;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.2	85.1	3.8	11.1
CATHOLIC	4.0	81.6	4.2	14.2
EVAN/PENT.	4.7	100.0	--	--
LUTHERAN	4.2	93.3	--	6.6
METHODIST	4.1	81.2	12.5	6.6
PRESBYTER'	3.6	58.3	--	41.7
PROTEST'NT	4.5	90.0	--	10.0
	4.1	84.2	3.0	12.8

1.10 Technology, the product of science, is subject to the tenets of Christian thought, scripture, theologies, philosophies of man and of the universe;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	3.1	48.1	12.2	40.7
CATHOLIC	3.5	62.0	8.0	30.0
EVAN/PENT.	4.0	65.0	20.0	15.0
LUTHERAN	2.0	28.6	21.4	50.0
METHODIST	3.1	61.5	1.0	37.5
PRESBYTER'	2.2	16.6	16.6	66.8
PROTEST'NT	4.7	65.0	5.0	30.0
	3.1	49.5	12.0	38.5

1.11 Christians, as advocates of justice, must be informed and engaged in societal decisions derived from science and technology;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.8	100.0	--	--
CATHOLIC	4.7	100.0	--	--
EVAN/PENT.	4.6	100.0	--	--
LUTHERAN	4.6	100.0	--	--
METHODIST	4.7	93.7	--	6.3
PRESBYTER'	4.8	100.0	--	--
PROTEST'NT	4.8	100.0	--	--
	4.7	99.1	--	0.9

1.12 The non-scientist's image of science can be enhanced by theology/religion's perspective on science;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	3.8	77.8	11.1	11.1
CATHOLIC	4.0	76.9	19.2	5.9
EVAN/PENT.	4.0	90.4	4.9	4.7
LUTHERAN	4.2	100.0	--	--
METHODIST	3.8	81.2	9.4	9.4
PRESBYTER'	3.8	75.0	16.6	8.4
PROTEST'NT	4.8	90.0	5.0	5.0
	4.0	84.4	9.3	6.3

2.0 CHURCH RELATED COLLEGES: RELIGIOUS STUDIES, THEOLOGY/SCIENCE AND TECHNOLOGY

2.1 In the United States of America, diverse in origin and unique in history, church related colleges were founded to educate men and women to bring their faith(s) to bear in prophetic protest applied to the structural causes of injustice;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	3.1	44.4	7.5	48.1
CATHOLIC	3.1	48.0	15.5	36.5
EVAN/PENT.	3.7	57.1	9.6	33.3
LUTHERAN	2.7	26.6	20.1	53.3
METHODIST	3.4	60.0	3.4	26.6
PRESBYTER'	2.6	33.3	--	66.6
PROTEST'NT	3.1	55.0	10.0	45.0
	2.9	46.3	9.5	44.2

2.2 Church related colleges were founded to educate laity committed to a faith tradition by emphasis on Liberal Arts, Philosophy and Religious Studies. As such they *should not* prepare graduates for those professions (Especially Sci/Tech) which require substantial resources and commitment;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.2	7.3	--	92.6
CATHOLIC	4.2	5.8	--	94.2
EVAN/PENT.	1.6	23.8	9.6	66.6
LUTHERAN	4.2	--	--	100.0
METHODIST	4.5	--	--	100.0
PRESBYTER'	4.2	8.3	8.3	83.4
PROTEST'NT	4.1	5.0	--	95.0
	3.7	7.1	14.8	78.1

2.3 Church related colleges were founded to evangelize thru science and technology;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	2.8	56.6	11.9	31.6
CATHOLIC	3.0	27.3	21.0	51.7
EVAN/PENT.	2.7	80.7	10.5	8.9
LUTHERAN	1.8	14.3	--	85.7
METHODIST	2.7	43.9	--	56.1
PRESBYTER'	2.2	59.7	--	40.3
PROTEST'NT	2.2	36.4	9.0	54.6
	2.4	45.5	7.5	46.9

2.4 Christians share a burden of guilt for the exploitation of the environment;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.5	96.1	0.0	3.9
CATHOLIC	4.5	96.1	4.9	--
EVAN/PENT.	4.5	95.2	4.8	--
LUTHERAN	4.3	92.8	7.2	--
METHODIST	4.2	93.7	6.3	--
PRESBYTER'	4.6	100.0	--	--
PROTEST'NT	4.5	100.0	--	--
	4.4	96.2	3.3	0.5

2.5 By definition, church related colleges stand apart from their cultures to prepare graduates to protest unjust consequences of societies use of human and natural resources;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	2.9	44.4	7.5	48.1
CATHOLIC	3.8	47.0	15.8	37.2
EVAN/PENT.	2.6	87.2	10.9	1.9
LUTHERAN	2.5	26.6	16.8	66.6
METHODIST	3.3	46.6	13.4	40.0
PRESBYTER'	3.8	75.0	8.4	16.6
PROTEST'NT	3.6	75.0	--	25.0
	3.2	57.4	9.0	33.6

2.6 Church related colleges should prepare graduates to engage in protest of the consequences of sin-based applications of science and technology;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	3.1	44.4	7.5	48.1
CATHOLIC	4.1	70.5	13.9	15.6
EVAN/PENT.	3.4	76.1	4.9	19.0
LUTHERAN	3.4	60.0	15.0	15.0
METHODIST	4.0	66.6	13.4	20.0
PRESBYTER'	3.8	66.6	8.4	25.0
PROTEST'NT	3.6	75.0	--	25.0
	3.6	65.6	11.5	23.9

2.7 Church related colleges should analyze and correct the consequences of Christians failure to apply science and technology to just ends;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	3.5	63.0	18.5	18.5
CATHOLIC	3.8	68.6	13.8	17.6
EVAN/PENT.	3.4	66.6	14.4	19.0
LUTHERAN	3.1	66.6	16.8	26.6
METHODIST	4.0	86.6	6.7	6.7
PRESBYTER'	3.2	58.3	8.4	33.3
PROTEST'NT	3.5	75.0	15.0	10.0
	3.5	69.2	12.0	18.8

2.8 Within your colleges *faith tradition* knowledge of Science and Technology practices are regarded as:

	SCALE	CRIT	ESS	USE	NOT-ESS	IRREL
BAPTIST	3.7	14.8	40.8	44.4	--	--
CATHOLIC	4.1	30.7	51.9	15.4	2.0	--
EVAN/PENT.	3.4	9.5	28.5	61.9	--	--
LUTHERAN	3.9	20.0	53.3	26.6	--	--
METHODIST	4.0	14.3	71.4	14.3	--	--
PRESBYTR'	4.3	50.0	33.3	16.4	--	--
PROTEST'N	4.1	40.0	30.0	30.0	--	--
	3.9	25.6	44.1	29.8	0.5	--

2.9 It is the responsibility of the church related colleges to provide integrative courses co-taught by theologians and scientists and focused on science- theology issues, methodology and history;

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.0	80.7	11.5	7.8
CATHOLIC	3.9	78.4	9.9	11.7
EVAN/PENT.	4.0	90.4	--	9.6
LUTHERAN	4.0	80.0	13.3	6.7
METHODIST	3.4	56.2	12.6	31.2
PRESBYTR'	4.3	83.3	16.7	--
PROTEST'N	4.0	85.0	--	15.0
	3.9	79.1	9.3	11.6

3.0 CHURCH RELATED COLLEGES: PRIORITIES AND CURRICULA AT YOUR COLLEGE:

3.1 The primary role of science/technology departments and faculty is *teaching about science and technology* as an element of religious & liberal education within your college's faith tradition.

	SCALE	AGREE %	N	DISAGREE
BAPTIST	3.1	51.9	3.7	44.4
CATHOLIC	2.6	27.4	21.6	51.0
EVAN/PENT.	3.8	76.1	4.9	19.0
LUTHERAN	2.6	26.8	26.6	46.6
METHODIST	3.1	43.7	--	56.3
PRESBYTR'	2.1	16.6	--	56.3
PROTEST'N	3.7	60.0	5.0	35.0
	2.9	43.2	11.1	46.7

3.2 The primary role of science/technology departments and faculty is *teaching about science and technology* as an element of liberal education.

	SCALE	AGREE %	N	DISAGREE
BAPTIST	3.7	70.3	--	96.2
CATHOLIC	3.9	80.7	5.9	84.3
EVAN/PENT.	3.2	76.1	9.6	80.9
LUTHERAN	3.8	80.0	--	93.3
METHODIST	3.6	75.0	--	100.0
PRESBYTER'	4.4	91.6	16.7	83.3
PROTEST'NT	4.2	100.0	--	--
	3.8	81.9	--	18.1

3.3 With regard to church related colleges' role and status in American higher education, baccalaureate level training of future scientists/technologists, the church related college *can compete* with public and non sectarian institutions in recruitment and training of undergraduates to enter graduate study in Science/Technology.

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.0	77.7	7.5	14.8
CATHOLIC	4.0	84.3	5.9	9.8
EVAN/PENT.	4.0	90.4	4.7	4.9
LUTHERAN	4.3	100.0	--	--
METHODIST	4.0	87.5	--	12.5
PRESBYTER'	4.4	91.6	8.4	--
PROTEST'NT	4.0	80.0	10.0	10.0
	4.1	87.3	5.3	7.4

3.4 The primary role of science/technology departments and faculty is *teaching science and technology* in order to prepare the next generation of scientists and technologists.

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.2	57.7	11.6	30.7
CATHOLIC	3.7	64.7	13.7	21.6
EVAN/PENT.	2.3	38.0	--	40.0
LUTHERAN	3.3	60.0	--	40.0
METHODIST	3.0	43.7	6.3	50.0
PRESBYTR'	4.6	50.0	16.4	33.3
PROTEST'N	3.2	60.0	--	40.0
	3.3	53.4	8.4	38.2

4.0 CHURCH RELATED COLLEGES: COURSES AND CONTENT

AT YOUR COLLEGE (% INDICATING YES):

4.1 Three or more Religious Studies/Theology courses are required;

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
41	33	76	20	31	8	35

4.2 Specific Religious Studies/Theology courses are required;

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
100	63	90	73	44	50	80

4.3 Specific Religious Studies/Theology courses that include integrative learning in Science/Technology and Religious Studies/Theology are offered;

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
37	58	62	60	38	42	45

At Your College Religious Studies/theology Courses Are Offered That Include the Topics:

4.4 Parallels and relationships in the theory and method of Theology and Science;

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
44	50	67	80	56	33	70

4.5 Historic relationships between theology and science -- concurrence and contradiction;

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
52	71	95	67	69	33	85

4.6 Current points of convergence/contradiction between theology and science;

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
52	69	90	87	63	50	85

4.7 Specific Religious issues arising out of science and technology;

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
81	88	76	73	88	67	95

4.8 Education of theologians, religious leaders and informed lay persons prepared to evangelize, and to offer prophetic protest and to form and shape science and technology as positive instruments of justice;

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
59	65	43	27	38	25	55

4.9 Reduction of estrangement between science and religion;

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
52	62	71	80	50	50	95

4.10 The universe including Cosmology, Creation, Evolution, (Solar Systems, The Earth, Human Life);

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
67	77	95	93	63	42	100

5.0 Church Related Colleges: Curricular and Life and Environmental Topics and Issues

QUESTIONS 5.1 - 5.10:

Respondents were asked to indicate the extent that environment topics/issues and life topics/issues are addressed in a) religious studies/theology courses; b) courses that integrate science and theology; c) science courses; d) other disciplines (social sciences, history, philosophy, education) or e) not included in any courses.

THE SET OF LIFE TOPICS/ISSUES ARE:

Abortion; Alcohol/Drug Use; AIDS; Artificial hydration and nutrition; Contraception; Consent agreements; Euthanasia; Fetal tissue research; Genetic Engineering; In Vitro fertilization; Physician assisted death; Population issues; Right to die.

THE SET OF ENVIRONMENTAL TOPICS/ISSUES ARE:

Recycling laws; Solar energy; Toxic waste disposal; World population; Deforestation of tropical rain forests; Endangered species; EPA, Clean Air Water Act; Fuel efficiency; Garbage (amount and disposal); Global pesticide sales; Greenhouse effect; Nuclear power; Nuclear waste storage; Ozone standards.

AT YOUR COLLEGE ALL OR SOME (AT LEAST 3) OF:

5.1 Life Topics/Issues *ARE* included in Religious Studies/Theology courses.

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
89	98	86	100	94	83	80

5.2 Environmental Topics/Issues *ARE* included in Religious studies/Theology courses.

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
67	71	57	87	69	67	65

5.3 Life Topics/Issues *ARE* included in courses that seek to integrate Science and Theology.

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
44	67	67	67	38	25	50

5.4 Environmental Topics/Issues *ARE* included in courses that seek to integrate Science and Theology.

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
44	62	67	60	25	25	55

5.5 Life topics are included in Science courses.

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
44	63	57	60	63	42	85

5.6 Environmental topics *ARE* included in Science courses.

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
81	88	76	73	88	83	90

5.7 Life topics *ARE* included in other disciplines (Social Sciences, Economics, History, Education, Philosophy).

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
78	92	86	80	94	92	85

5.8 Environmental topics *ARE* included in other disciplines (Social Sciences, Economics, History, Education, Philosophy).

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
59	87	67	87	81	92	80

5.9 Life topics *ARE NOT* included in any courses offered at your College.

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
15	0	5	0	0	0	0

5.10 Environmental topics *ARE NOT* included in any courses offered at your College.

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
77	2	14	0	0	0	0

The following topics *ARE* included in courses that integrate science and theology:

5.11 Medicine's impact upon religion

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
37	71	48	60	38	50	

5.12 Personal/Societal responsibilities for Healthy Behaviors

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
59	75	86	87	50	50	75

5.13 Access to Health Care

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
26	75	48	60	44	17	50

5.14 Developing country issues including infant mortality, food supply, public health interventions;

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
44	65	57	73	44	25	75

5.15 National policy and issues including impact of technology, societal control of technology, cost/risk benefit analysis, rationing of technologies e.g.(organs and blood);

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
37	7	33	60	38	50	50

5.16 Mental attitudes' influence on the human immune system;

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
37	3	43	20	31	8	40

5.17 These topics *ARE* included in other disciplines (History, Political Science, Sociology, Psychology, Education, Economics, Philosophy).

BAPTIST	CATHOLIC	EVAN/PENT	LUTHERAN	METH	PRESBT	PROT
78	9	86	73	81	92	90

6.0 EXTRA-CURRICULAR ACTIVITIES AT YOUR COLLEGE:

6.1 Students actively participate in extra curricular activities concerned with single or multiple issues as those listed above.

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.7	92.6	3.7	3.7
CATHOLIC	4.9	98.0	2.0	--
EVAN/PENT	4.7	95.3	4.7	--
LUTHERAN	4.8	100.0	--	--
METHODIST	4.6	93.3	--	6.9
PRESBYTER'	4.6	100.0	--	--
PROTEST'NT	4.9	95.0	5.0	--
	4.7	96.3	2.2	1.5

6.2 Students are prepared to participate in the *evangelization* of their culture's application of science and technology.

	SCALE	AGREE %	N	DISAGREE
BAPTIST	4.1	80.7	15.3	4.0
CATHOLIC	4.0	67.3	32.7	--
EVAN/PENT.	4.2	80.9	19.1	--
LUTHERAN	4.1	85.7	14.3	--
METHODIST	3.9	80.0	13.3	6.7
PRESBYTER'	3.8	83.3	16.7	--
PROTEST'NT	4.2	80.0	20.0	--
	4.0	79.7	18.7	1.6

PART II: SURVEY OF SCIENCE CHAIRS (OCTOBER, 1989)

1.0 MISSION AND STATUS OF SCIENCE/TECHNOLOGY PROGRAMS AT CHURCH RELATED COLLEGES

1.1 At your college, the role of science and technology departments and faculty is to *teach science and technology* in order to prepare the next generation of scientists and technologists.

	SCALE	AGREE %	N	DISAGREE
BIOL	4.35	94.0	2.0	4.0
CH	4.50	97.0	--	3.0
PH	4.31	94.0	--	6.0
NS	4.32	88.0	6.0	6.0
	4.37	93.0	2.0	5.0

1.2 At your college, the role of science and - ence/technology departments and faculty is to *teach about science and technologies* component of a liberal education.

	SCALE	AGREE %	N	DISAGREE
BIOL	4.41	95.0	2.0	3.0
CH	4.26	90.0	1.0	9.0
PH	4.20	92.0	0.0	8.0
NS	4.34	97.0	--	3.0
	4.30	93.5	1.5	5.7

1.3 At your college, the role of science/technology departments and faculty is to *teach about science and technology* as a component of religious and liberal education within your college's faith tradition.

	SCALE	AGREE %	N	DISAGREE
BIOL	2.68	37.0	10.0	53.0
CH	2.62	36.0	13.0	51.0
PH	2.45	29.0	8.0	63.0
NS	2.66	37.5	6.2	56.2
	2.60	35.0	9.2	55.7

1.4 Sci/Tech and religion are interrelated, i.e. students are taught that methods and content of Sci/Tech are relevant to religion as a field of study.

	SCALE	AGREE %	N	DISAGREE
BIOL	2.58	29.7	12.7	57.4
CH	2.37	17.7	22.9	58.3
PH	2.29	24.3	8.1	67.5
NS	2.57	31.4	5.7	62.8
	2.45	25.7	12.3	61.5

1.5 The ethical aspect of the practice of religion requires that members of your college's faith tradition understand the scientific and technological basis of public issues.

	SCALE	AGREE %	N	DISAGREE
BIOL	3.63	63.0	22.0	15.0
CH	3.33	61.0	12.0	27.0
PH	3.62	68.0	11.0	21.0
NS	3.51	63.0	11.0	26.0
	3.52	63.7	14.0	22.3

1.6 Sci/Tech is a *high priority* as measured by Sci/Tech requirements for non Sci/Tech students.

	SCALE	AGREE %	N	DISAGREE
BIOL	3.05	47.0	12.0	41.0
CH	2.38	24.0	10.0	66.0
PH	2.64	28.0	14.0	58.0
NS	2.47	30.0	--	70.0
	2.63	32.2	12.0	58.7

2.0 RESOURCES

2.1 The *total space* available on campus is adequate for students in our college preparing to enter the scientific and technological professions.

	SCALE	AGREE %	N	DISAGREE
BIOL	2.86	63.0	5.0	32.0
CH	3.96	82.0	6.0	12.0
PH	3.68	72.0	7.0	21.0
NS	3.45	72.0	--	28.0
	3.48	72.2	4.5	23.2

1.7 Sci/Tech is a *high priority* as measured by active recruitment of superior high school Sci/Tech graduates and provision of scholarships and related support for such students.

	SCALE	AGREE %	N	DISAGREE
BIOL	3.26	56.0	6.0	38.0
CH	2.90	40.0	16.0	44.0
PH	3.08	43.0	22.0	35.0
NS	2.85	44.0	6.0	50.0
	3.02	45.7	12.5	41.7

1.8 Our college provides *instruction* that is adequate (as measured by admission of our graduates into M.S. and Ph.D. programs in the sciences) to prepare students for careers as professionals in the sciences and technology.

	SCALE	AGREE %	N	DISAGREE
BIOL	4.70	99.0	--	1.0
CH	4.67	96.0	2.0	2.0
PH	4.51	97.0	0.0	3.0
NS	4.48	94.0	0.0	6.0
	4.59	96.5	0.5	3.0

2.2 *The buildings and classrooms* (age, condition) in our college are adequate for students preparing to enter the scientific and technological professions.

	SCALE	AGREE %	N	DISAGREE
BIOL	3.72	75.0	2.0	23.0
CH	3.94	80.0	4.0	16.0
PH	3.72	73.0	7.0	20.0
NS	3.45	68.0	3.0	29.0
	3.70	74.0	4.0	22.0

2.3 The *laboratories* on our campus are adequate for preparing students who wish to enter the scientific and technological professions.

	SCALE	AGREE %	N	DISAGREE
BIOL	3.51	63.0	4.0	33.0
CH	3.65	70.0	5.0	25.0
PH	3.37	62.0	6.0	32.0
NS	3.48	74.0	--	26.0
	3.50	67.2	3.7	29.0

2.4 The biological and chemical *supplies* available on campus are adequate for preparing students who wish to enter the scientific and technological professions.

	SCALE	AGREE %	N	DISAGREE
BIOL	3.82	51.0	5.0	44.0
CH	4.06	86.0	5.0	9.0
PH	3.75	67.0	24.0	9.0
NS	3.65	77.0	3.0	20.0
	3.82	70.2	9.2	20.5

2.5 The *books and journals* available in our library are adequate for students who wish to enter the scientific and technological professions.

	SCALE	AGREE %	N	DISAGREE
BIOL	3.16	24.0	9.0	67.0
CH	3.31	22.0	12.0	66.0
PH	3.63	23.0	11.0	66.0
NS	2.91	24.0	5.0	71.0
	3.25	23.2	9.2	67.5

3.0 FACULTY

3.1 The *quality of our faculty* (as measured by their advanced degrees) is adequate to prepare students for careers as professionals in the sciences and technology.

	SCALE	AGREE %	N	DISAGREE
BIOL	4.69	98.0	--	2.0
CH	4.70	98.0	1.0	1.0
PH	4.63	99.0	--	1.0
NS	4.68	97.0	--	3.0
	4.67	98.0	--	2.0

3.2 The *commitment of our faculty* (measured by the time and effort devoted to training students in class, laboratory, seminars, journal clubs, independent research) is adequate to prepare students.

	SCALE	AGREE %	N	DISAGREE
BIOL	4.66	99.0	--	1.0
CH	4.73	98.0	1.0	1.0
PH	4.67	96.0	3.0	1.0
NS	4.51	94.0	--	6.0
	4.64	96.7	1.0	2.2

3.3 Number of our faculty both full-time & part-time is adequate to provide instruction in preparation for admission to graduate school.

	SCALE	AGREE %	N	DISAGREE
BIOL	3.80	75.0	5.0	20.0
CH	3.48	61.0	4.0	3.5
PH	3.64	72.0	3.0	25.0
NS	3.37	60.0	8.0	32.0
	3.57	67.0	5.0	28.0

3.4 The *compensation of our faculty* (measured by the administration's awareness of the need to compete with industry for qualified, committed teachers) is adequate to prepare students for careers as professionals in science & technology.

	SCALE	AGREE %	N	DISAGREE
BIOL	3.80	75.0	5.0	20.0
CH	3.48	38.0	7.0	55.0
PH	3.64	49.0	9.0	42.0
NS	3.37	31.0	9.0	60.0
	3.57	48.2	7.5	44.2

4.0 STUDENTS: PREPARATION

4.1 Students entering your college from high school are suitably prepared for courses in *math.*

	SCALE	AGREE %	N	DISAGREE
BIOL	2.46	24.0	9.0	67.0
CH	2.50	22.0	13.0	65.0
PH	2.37	23.0	11.0	66.0
NS	2.31	23.0	9.0	68.0
	2.41	23.0	10.5	66.5

4.2 Students entering your college from high school are suitably prepared for courses in *biology.*

	SCALE	AGREE %	N	DISAGREE
BIOL	3.34	63.0	3.0	34.0
CH	3.88	58.0	34.0	8.0
PH	3.45	45.0	50.0	5.0
NS	3.40	60.0	11.0	29.0
	3.51	56.5	24.5	19.0

4.3 Students entering your college from high school are suitably prepared for courses in *chemistry.*

	SCALE	AGREE %	N	DISAGREE
BIOL	2.85	39.0	11.0	50.0
CH	2.98	39.0	15.0	44.0
PH	3.20	42.0	36.0	22.0
NS	2.68	32.0	8.0	60.0
	2.92	38.0	17.5	44.0

4.4 Students entering your college from high school are suitably prepared for courses in *physics.*

	SCALE	AGREE %	N	DISAGREE
BIOL	2.67	31.0	16.0	53.0
CH	2.39	11.0	32.0	57.0
PH	2.64	32.0	16.0	52.0
NS	2.22	15.0	11.0	74.0
	2.48	22.3	18.7	59.0

4.5 Students entering your college from high school are suitably prepared for courses in the *sciences,* other than biology, chemistry and physics.

	SCALE	AGREE %	N	DISAGREE
BIOL	2.86	26.0	37.0	37.0
CH	2.94	22.0	55.0	23.0
PH	3.01	26.0	49.0	25.0
NS	2.71	15.0	49.0	36.0
	2.88	22.7	47.5	30.3

5.0 STUDENTS: AWARENESS

5.1 Students entering your college are aware of and/or concerned about *medical waste disposal.*

	SCALE	AGREE %	N	DISAGREE
BIOL	1.87	26.0	19.0	55.0
CH	2.56	16.0	37.0	47.0
PH	2.58	13.0	39.0	48.0
NS	2.42	23.0	18.0	59.0
	2.35	19.5	28.2	52.2

5.2 Students entering your college are aware of and/or concerned about *deforestation of tropical rain forests.*

	SCALE	AGREE %	N	DISAGREE
BIOL	2.05	30.0	21.0	49.0
CH	2.62	21.0	30.0	49.0
PH	2.63	18.0	37.0	45.0
NS	2.54	17.0	23.0	60.0
	2.46	21.5	27.7	50.7

5.3 Students entering your college are aware of and/or concerned about *global warming.*

	SCALE	AGREE %	N	DISAGREE
BIOL	1.89	24.0	27.0	49.0
CH	2.75	21.0	38.0	41.0
PH	2.66	17.0	39.0	44.0
NS	2.62	26.0	17.0	57.0
	2.48	22.0	30.0	48.0

5.4 Students entering your college are aware of and/or concerned about the *green house effect.*

	SCALE	AGREE %	N	DISAGREE
BIOL	1.92	29.0	21.0	50.0
CH	2.86	26.0	35.0	39.0
PH	2.72	22.0	35.0	43.0
NS	2.65	26.0	20.0	54.0
	2.53	25.7	27.7	46.5

5.5 Students entering your college are aware of and/or concerned about *acid rain.*

	SCALE	AGREE %	N	DISAGREE
BIOL	2.09	35.0	20.0	45.0
CH	2.92	43.0	27.0	30.0
PH	2.81	26.0	35.0	39.0
NS	2.48	31.0	20.0	49.0
	2.57	33.7	25.5	40.7

5.6 Students entering your college are aware of and/or concerned about *toxic waste disposal.*

	SCALE	AGREE %	N	DISAGREE
BIOL	2.25	33.0	27.0	40.0
CH	2.73	33.0	18.0	49.0
PH	2.79	23.0	38.0	39.0
NS	2.88	37.0	17.0	46.0
	2.66	31.5	25.0	43.5

5.7 Students entering your college are aware of and/or concerned about *nuclear waste storage.*

	SCALE	AGREE %	N	DISAGREE
BIOL	2.21	35.0	24.0	41.0
CH	2.89	34.0	25.0	41.0
PH	2.85	26.0	38.0	36.0
NS	2.88	37.0	20.0	43.0
	2.70	33.0	26.7	40.2

5.8 Students entering your college are aware of and/or concerned about *food supplies in developing countries.*

	SCALE	AGREE %	N	DISAGREE
BIOL	2.27	37.0	22.0	41.0
CH	2.82	32.0	23.0	45.0
PH	2.78	26.0	35.0	39.0
NS	2.94	37.0	23.0	40.0
	2.70	33.0	25.7	41.3

5.9 Students entering your college are aware of and/or concerned about *AIDS.*

	SCALE	AGREE %	N	DISAGREE
BIOL	3.63	76.0	12.0	12.0
CH	3.77	77.0	15.0	8.0
PH	3.74	72.0	22.0	6.0
NS	3.77	77.0	11.0	12.0
	3.72	75.5	15.0	9.5

5.10 Students entering your college are aware of and/or concerned about *drug abuse.*

	SCALE	AGREE %	N	DISAGREE
BIOL	3.74	80.0	12.0	8.0
CH	3.96	84.0	11.0	5.0
PH	3.77	73.0	23.0	4.0
NS	3.88	80.0	14.0	6.0
	3.83	79.2	15.0	5.7

6.0 CRC: RELIGION, SCIENCE & TECHNOLOGY

6.1 With regard to church related colleges' role and status in American higher education, baccalaureate level training of future scientists and technologists *is essential,* given the importance of faith and ethics within the Sci/Tech profession.

	SCALE	AGREE %	N	DISAGREE
BIOL	4.30	86.0	8.0	6.0
CH	4.17	89.0	6.0	5.0
PH	4.22	80.0	15.0	5.0
NS	4.00	80.0	5.0	15.0
	4.17	83.7	8.5	7.7

6.2 *Re* CRC's role and status in American higher ed, baccalaureate level training of future scientists and technologists, CRC's *cannot compete* with public & non-sectarian institutions in recruiting & training undergraduates to enter graduate study in Science/Technology.

	SCALE	AGREE %	N	DISAGREE
BIOL	2.73	11.0	5.0	84.0
CH	1.46	3.0	3.0	94.0
PH	2.05	11.0	4.0	85.0
NS	2.09	20.0	4.0	76.0
	2.08	11.2	4.0	84.7

6.3 With regard to CRC's role and status in American higher ed, baccalaureate level training of future scientists/technologists is not essential; churches, the Sci/Tech community, legislators, judicial process and an informed public will maintain ethical standards on Sci/Tech issues.

	SCALE	AGREE %	N	DISAGREE
BIOL	1.57	9.0	0.0	91.0
CH	1.55	4.0	5.0	91.0
PH	1.94	4.0	5.0	91.0
NS	1.64	9.0	3.0	88.0
	1.67	6.5	3.2	90.2

6.4 CRCs were founded to educate laity committed to a faith tradition by emphasis on Liberal Arts, Philosophy and Religious Studies. As such they should not prepare graduates for those professions (Especially Sci/Tech) which require substantial resources and commitment.

	SCALE	AGREE %	N	DISAGREE
BIOL	1.37	6.0	0.0	94.0
CH	1.28	3.0	2.0	95.0
PH	1.31	0.0	3.0	97.0
NS	1.45	9.0	3.0	88.0
	1.35	4.5	2.0	93.5

6.5 Students are made aware of *scientific discovery* as related to the understanding of your faith tradition &/or to the further development of that faith tradition.

	SCALE	AGREE %	N	DISAGREE
BIOL	2.60	35.0	25.0	40.0
CH	2.71	25.0	30.0	45.0
PH	2.67	29.0	22.0	49.0
NS	2.88	41.0	15.0	44.0
	2.71	32.5	23.0	44.5

6.6 Within your colleges faith tradition knowledge of Sci/Tech and practice are regarded as:

	CRIT	ESSN	USE	N-ESSN	IRREL	
BIOL	12 %	30 %	41 %	13 %	4 %	100%
CH	3	23	51	16	7	100%
PH	2	26	44	18	10	100%
NS	11	23	49	14	3	100%
AVE	7%	25.5%	46.2%	15.2%	6.0%	

7.0 BACCALAUREATE DEGREES AWARDED BY DEPARTMENT, 1988

	0-5	6-10	11-15	16-20	20+	
BIOL	13	22	16	15	27	93
	13.9	23.6	17.2	16.1	29	
CH	43	33	9	3	7	95
	45.2	34.8	9.4	3	7.5	
PH	43	15	10	1	3	72
	59.7	20.8	13.8	1	4.1	
NS	11.4	40	20	8.5	20	
	4	14	7	3	7	35
	103	84	42	22	44	295

METHODOLOGY

1215 Chairmen of Biology, Chemistry, Physics and Natural Science departments of 794 church related colleges were asked to complete and return a thirty seven item opinion questionnaire; designed to assist ITEST efforts to determine the current and projected status of science and technology education on the undergraduate level in church related colleges. This study is intended to be exploratory i.e. a pilot. Respondents were asked to select one of five levels of agreement-disagreement or no opinion. Information was requested on the number of baccalaureate degrees awarded in 1988. Four statements designed to elucidate respondents opinions on science & technology education within their college or university were included. 301 responses (24.7%) were received: from chairs of Biology (94), Chemistry (96), Physics (74), and Natural Science (35). (Nineteen responses were received too late for inclusion in tabulations). 190 respondents volunteered the names of 28 denominations and 127 did not specify their college or university denomination. Geographical distribution was national.

Responses to 37 questions were scanned and converted into a continuum scale based on 5 as the highest value of agreement with each statement: (5) strongly agree; (4) agree; (3) no opinion; (2) disagree; (1) strongly disagree. The five levels of responses were also combined into agree, disagree and no-opinion and are reported as percent distribution. Results are contained in the charts immediately above. Of the four opinion statements given

for respondents comments, 274 were returned. Of these, 68 diverse and provocative statements were selected and are reported in Appendix 2. Chairpersons also sent twelve mission statements and seven offered additional opinion statements.

RECOMMENDATIONS

Following is an abstract of the survey based on review of responses to the 37 statements in tandem with the essay or opinions offered by the respective chairs. The investigation suggests that church related college's faculty and administrators should upgrade their denominations and the publics perception of the unique mission of church related college's role in the education of generalists and professionals ability to integrate and act on scientific and theological knowledge and insight.

ITEST should conduct a follow-up study focused on the educational philosophy of church related colleges; the desirability of integrated course(s) that address:

(1) ethics of Sci/tech *per se* (2) sci/tech based issues on social justice and ethical matters concerning man, earth, environment, space); (3)comparative methodologies of science, technology, religion and social sciences.

(2) plan a 1990 conference organized to develop curricular materials designed to assist church related colleges faculty to interrelate theological and science & technology instructional goals and objectives through courses, seminars and lecture series.

(3) encourage the formation of denominational and college consortia focused on science and technology, theology and public policy. Note this should be pursued in conjunction with the executives of church related higher education group, council of independent colleges and the various denominational college and university organizations.

(4) participate in initiation and support of legislation designed to support education of scientist and technologists with special focus on facilities, training and scholarships, including recruitment of minority faculty and students.

ABSTRACT

1.1 - 1.5

Church Related Colleges are committed to preparation of Baccalaureate level graduates for advanced studies in the sciences and technology. Respondents consider science as essential to the Liberal arts and science degree programs offered by their respective institutions. However science and technology instruction as a component of religious education or within their colleges denominational tradition is minimized.

The concept of methodological comparability between science and religion is apparently denied, which suggest that instruction in theological methodology is missing, thus diminishing the basis of conversation amongst and between scientists and theologians. (The investigator assumes that scientific methodology i.e., beyond technical competence is paramount in undergraduate science instruction regardless of the role of the department, i.e., pre-professional, devoted to liberal education, per se and/or to the religious and philosophical rationale of the respondents college).

A more positive attitude is expressed when the inquiry is focused on ethical aspects of religious practice.

1.6 - 1.8

The "priority" of Sci/Tech as measured by recruitment, support of students, and curricular status viewed more positively by biologists with natural scientists the least, with however a low margin of difference among the four disciplines. (Do church related college's with limited resources imperil professional, liberative and integrative goals by reliance on a multi-science departments limited faculty and curricula, in spite of the conviction that instruction is adequate for admission to Graduate School?).

2.1 - 2.5

Contrary to prior investigations (Oberlin, NSF), proposed Federal college facilities legislation, institutional advancement agenda and philanthropic strategies, respondents believed that the overall church related college's science infrastructure is adequate.

3.0 - 3.4

Church related college's faculty are well qualified and committed; compensation is adequate; church related college's Sci/Tech departments might be enhanced with additional members. Note the increasing number of projections of faculty and replacement into the next century.

4.1 - None too complimentary

Respondents assessment of pre-college (secondary school) preparation is provided for comparison:

CHAIR	BIOL	CH	PH	NS	AV
PRE-COL.					
4.1 Math	2.46	2.50	2.37	2.31	2.41
4.2 Bio	3.34	3.88	3.45	3.40	3.51
4.3 Chem	2.85	2.98	3.20	2.68	2.92
4.4 Phys	2.67	2.39	2.64	2.22	2.48
4.5 Other Sci	2.86	2.94	3.01	2.71	2.88
Average	2.84	2.94	2.93	2.66	2.84

5.1 - 5.10

Church related college's were founded to manifest an impressive range of values from intellectual, education of clergy and laity, evangelical and salvational. And, as scientific and technological advances have cascaded through our culture and institutions, increased sensitivity to the fragility of the earth and people has followed. That entering students score lowest on global issues and relatively higher on life style choices suggest that definition of church related college's mission to its students lives and to global issues is more critical now than in less informed times:

CHAIR

ISSUE	BIOL	CH	PH	NS	T
5.1 med. waste	1.87	2.56	2.58	2.42	2.35
5.2 deforestation	2.05	2.62	2.63	2.54	2.46
5.3 global warm'	1.89	2.75	2.66	2.62	2.48
5.4 green house	1.92	2.86	2.72	2.65	2.53
5.5 acid rain	2.09	2.92	2.81	2.48	2.57
5.6 toxic waste	2.25	2.73	2.79	2.88	2.66
5.7 nuclear waste	2.21	2.89	2.85	2.88	2.70
5.8 food supply	2.27	2.82	2.78	2.94	2.70
5.9 aids	3.63	3.77	3.74	3.77	3.72
5.10 drug abuse	3.74	3.96	3.77	3.88	3.83
Average	2.39	2.99	2.93	2.91	2.80

6.1 - 6.6

Polarization characterizes section 6. Church related college's chairs are clearly dedicated to the function of scientific and technological literacy and competence within faith based liberal arts and pre professional Baccalaureate degree programs. Items 6.1 - 6.4 suggest a strong commitment to the CRC mission. Item 6.5 dispels assumptions that a unified or organic approach to the pedagogic integration of disparate intellectual systems. As to Item 6.6, ITEST'S mission is one of encounter i.e. to come upon face to face. This survey suggests that ITEST is uniquely qualified to pursue the dynamics of encounter in that precious environment, the church related college. Over 300 CRC/CP's are amenable to a dialogue and in need of support.

SUMMARY

1. CRC'S are committed to preparation of scientists and technologists.

2. CRC'S are committed to teaching science and technology within the framework of liberal education.

3. CRC respondents are not convinced that science and technology instruction is a component

of religious and liberal education.

4. Science and technology programs and courses generate a mixed response in rating of their priority within the CRC'S liberal arts and science degree programs.

5. A medium response on the issue of the commitment of resources to the recruitment of superior high school graduates to enter 5 tech undergraduate degree programs.

6. Disagreement with the notion that science and technology instruction and religion courses are interrelated, that is, that the methodology and content are viewed as a whole with the goal of teaching the undergraduates that both are exploratory scientific evidenced based disciplines.

7. Total concurrence in the idea that the ethical aspects of their respective religious persuasion includes knowledge of the science and technological basis of public issues.

8. It is essential that CRC'S maintain a strong presence in science and technology education within American higher education.

9. Respondents are convinced that church related colleges can compete with public and non-sectarian institutions in recruitment and training of undergraduates to enter or prepare for graduate study in science and technology.

10. Public concern for ethical issues cannot be maintained by the community at large, the legislative, or judicial process.

11. An informed public will not suffice for well--trained, church related, college graduates competent in the basics of science and technology in pursuit of ethical norms issue spacing American and worldwide society.

12. In keeping with prior comments on the inter--relatedness of science and religion information and methodology, respondents also indicate students are not made aware of the relationship between scientific discovery as it relates to understanding of the respective faith traditions. That such a relationship should occur was not contained within the survey and should be discussed by ITEST participants.

13. Almost total conviction that instruction is adequate in terms of admissions to graduates of church related colleges to graduate programs in the sciences and technology.

14. through 22. All highs on the positive scale in terms of the quality of the faculty, the commitment of the faculty, 99.1, are adequate.

16. Disagree that faculty are adequately compensated for their efforts or that church related colleges compete effectively with industry for qualified committed scientists, technologists who could be lured into collegiate teaching professions.

17. Medium agreement on the number of full and part-time faculty available for science instruction.

18. As with Oberland and other studies, middle of the road response to the adequacy of buildings and classrooms, total space available, number and quality of laboratories, support by provision of supplies, and number and quality of books and journals available in respective college libraries relevant to science technology instruction.

23 through 27. Basically low end of the scale and significant disagreement with the notion that students are adequately prepared to enter courses in mathematics, the biological sciences, chemistry and physics, or are adequately prepared for courses in other areas of the sciences. We would note that the lowest level on this scale is in mathematics and the highest level of preparation is in the biological sciences, with chemistry and physics holding the middle ground.

28 through 36. Attempt to assess student awareness of various science and technology issues yields two observations Students are minimally aware of the impact of global warning. acid rain, the greenhouse effect, tropical deforestration, toxic waste disposal, and nuclear waste storage and medical waste disposal. They score very high in the respondents sense of the students awareness of drug issues, i.e., typical undergraduate most aware of what effects them directly, less informed on national and global environmental issues.

In response to the question raised in one of the October, 1989 ITEST Workshop pre-papers:

Is science technology education on the part of

Church related Colleges really feasible, with subsets on the issue of finance as applied to the application of human and physical resources?

While the responses indicate a high level of commitment of the faculty, which in my judgment reflects commitment within the framework of the institutional mission, to support science instruction, the level of support is mixed in terms of buildings, laboratories, equipment, and supplies. It is at this point where one could return to a more reliable study of this subject with the Oberland Report of 1987 which analyzed 50 colleges and was highly effective in influencing current legislation for the support of undergraduate science education programs. Nonetheless, the Church related colleges, though not necessarily in the Oberland group, or institutions supported by other public or private sector groups, are heavily committed to maintenance of a role in science education.

However, in what way science-technologies education can enrich the more general liberal arts emphasis of Church related colleges and in what way liberal arts can enrich the science-technology training are somewhat disturbing. It would appear that in science and technology as related to religion, both in content and methodology, there is little effort, perhaps little interest and perhaps opposition to approaching the subject of theology and science in an intergrative matter attempting to relate scientific data and progress to impact on the fundamentals of theology and of state practice, other than the realm of ethics as applied to primary environmental issues.

APPENDIX 2

8.0 Selected Responses to the Question:

In what ways might the liberal arts enrich sci/tech education, in either context -- education in science or about science?

8.1 Science without liberal arts is poor science. A study of liberal arts without recognition of the process of science and technology is no education at all. Current societal problems have direct science and technology components, but the direction of society and the allocation of resources are traditional liberal arts decisions. Even the choice of problems on which to work by an investigator is an ethical decision. Thus one must conclude that the only responsible education of a scientist is in a liberal arts college and that a liberal arts education must have a science/technology component.

8.2 a) Do their classical job. (Several of the classical subjects included under "liberal arts" *are* sciences.)

b) Require more courses in the sciences to receive the A.B. degree. (The present two semesters required here is ludicrous.)

c) Professors teaching courses in philosophy and theology might invite science professors to give guest lectures in their courses.

8.3 Pass.

8.4 Our general education requirements have just been revised to include a course in Science/Technology to be taken by all students in junior or senior year. This course will be developed within an historical context and will address concerns such as those mentioned in items #27-36.

8.5 We offer a one-semester "Science and Religion" course, co-taught by a Physicist and a Theologist. Our analysis are from "historical" survey to "contemporary" but usually includes both.

8.6 The liberal arts (true liberal arts, not just some vague humanities requirement) would enrich science education by showing the destructive assumptions inherent in scientific thinking. The liberal arts should teach critical thinking about such problematic scientific notions as progress, efficiency, and perfectibility.

8.7 Science without being set in a broader context is a perilous enterprise, as our history attests. Hopefully a liberal arts curriculum provides future scientists with the moral/value context they need to be contributors to society rather than dangers to it.

8.8 There are many ways in which the liberal arts could enrich sci/tech education. *Philosophy* courses could emphasize how the Greek way of thinking led to science, starting with the pre-Socratics. Students could also be made aware of the Anthropic Principle which emphasizes the narrow range of values which our physical constants must have to enable life to exist. Philosophy would also point out the different causes, material, formal, final, efficient, and how predictability of the behavior of material does not imply a comprehension of

the essence of material. *History* courses could include the religious motivation of many scientists, such as Newton, Duhem, Pascal and Alexis Carrell. History courses could also include Thomas Kuhn's emphasis on the role of the paradigm in science and the difficulty of changing it. History could show that modern science derives from Greek philosophy combined with the experimentations carried out by Renaissance man. Technology existed in Egypt, China, etc., but did not develop into science.

9.0 Selected Responses to the Question:

If you believe church related colleges should offer baccalaureate curricula designed to prepare graduates to seek advanced degrees in science or technology, indicate a rationale specific to the mission of church related colleges that would justify investment in preparation of future scientists. (This may be a broad philosophical or theological statement, or a statement descriptive of the theological statement, or a statement descriptive of the role and status of science within your faith traditions.)

9.1 If the undergraduate curriculum does not demand more knowledge of the sciences, especially the biological sciences, it will not be too long before the churches will have no parishioners, for life (human) may vanish from this planet.

9.2 Clearly, there are life and death issues facing mankind and earth (along with all its inhabitants) that require a thorough knowledge of the scientific/technological aspects e.g. global warming, acid rain, nuclear weapons and waste disposal etc. Preparing competent scientists to deal with these issues is an absolute necessity. Preparing scientists who, by their training, are *also* alert to the ethical dimensions of these issues at the same time appears to be one area where church related colleges can play an important if not unique role. If church related institutions abdicate their responsibility to educate *both* scientifically literate as well as ethically well-formed individuals, who can be expected to do it? It appears to me that church related colleges are contributing to an ethical vacuum if they do not invest in sound scientific education as well as value education.

9.3 It seems to me that science is increasingly concerned with the role of *values* in research and policy decisions. Issues such as environmental problems, scientific fraud, genetic manipulation, etc. raise ethical questions that students must learn to confront. St. Anselm College, as a Catholic liberal arts institution, can provide an excellent scientific education with significant opportunities for undergraduate research, while also emphasizing the importance of human values in the application and pursuit of technical knowledge.

9.4 Most Historically Black Colleges are church-related. They are the prime providers of education for black people. Statistics show that the majority of the successful black graduates of colleges are graduates of Historically Black Colleges. With these facts, HBC's have a responsibility to train students in all professions, regardless of the religious ties.

9.5 Education in our faith tradition should be *Catholic* and freeing. All aspects of our human lives are affected by science and technology; hence these are an essential component of a liberal education.

9.6 There is no conflict between science and the Methodist tradition of our college. Protestant (mainstream) and its emphasis on hard work to achieve desirable ends fits comfortably with the demands of science education.

9.7 I certainly do believe that church related colleges such as ours should offer science and technology training. We have been doing such for many years and are noted for our accomplishments in this area and have not seen it as incompatible. We believe that it is a mandate to understand as well as possible the components of the world as we now know it. Science at this college has always been one of the two strongest areas available. The church has supported this and is willing to consider seriously what we pronounce. We want our students to think critically, to discriminate values, and be competent in problem-solving all of which can be enhanced through the study of science. We also seek truth and science is certainly one of the places to attempt that.

9.8 As a Catholic I have always felt uncomfortable in the discussions which attend questions of responsibility, ethical behavior, prudent development of science and technology. Catholic Universities have, historically, contributed proportionally less to the education of scientists than they have to

Medicine, Law and Engineering. This lack of involvement is out of keeping with pronouncements concerning ethical dilemmas in science, an enthusiasm which Catholic institutions have felt appropriate and obligatory. For my part, we are not sufficiently involved in the education of research scientists to glibly comment on the value of science and its societal effects.

9.9 Scientists are consistently working to find proximate causes of events. All events, in the context of a Supreme Being are manifestations of God's Divine Plan and man's intelligence is the gift from Him by which we can see order in the Universe. It is incumbent upon us to use those gifts to the extent that we can, and with the expectation that it can benefit humanity.

9.10 This has nothing to do w/faith tradition but rather w/a liberal arts education. We feel those w/a liberal arts education are better able to grasp the implications and ramifications of their chosen fields.

9.11 First, liberal arts colleges (church related or not) are a major source of scientists which the nation very much needs in the coming decades. It would be irresponsible for such institution to shift their duty by giving up their historical role in this area. Second, these schools *can* provide the supporting environment needed to bring more women and minorities into the sciences, thus serving society in two ways at once. Such institutions should also serve to produce scientists with needed ethical sensitivities. All of these are well within the tradition of the United Church of Christ.

9.12 The entire realm of animal rights and human rights is broad enough to rationalize a role for church related schools. Issues in genetics, reproductive technologies, drug manufacturing, (i.e. orphan drugs), heroic efforts to sustain life, ethical use of resources and toxic waste management, to name a few, all require an ethical and philosophical base from which we need to begin, implement, and refine our laws and statutes.

9.13 Our college is not the place to be asking these questions -- our church connection is loose at best. Our students' religious preferences match the state's demographics and our science faculty of 11 has only one member of our parent church. Even so, there is a campus-wide concern for Christianity and ethics. We teach, live, really, that there is something besides science and even our most focused majors must be different than those that graduate from the big state science factories, where the student can get by by taking only a few courses in areas other than science.

9.14 a) I do believe.
b) Churches have an obligation and a vocation to be counter-cultural prophets.

9.15 The church has the potential of instilling a humaneness to future scientists. It can provide an ethical framework for decision making and action.

9.16 If religion is to pervade all of human life, how can we ignore one of humankinds greatest philosophies: Science?

9.17 The world needs scientists motivated to:
a) help solve some of the world's problems
b) help bring the gospel to non-Christians in science
c) be role-models of Christ-followers, disciples, among others, including our youth.
d) be tuned to a high ethic in all areas of being.

9.18 It is important that sci/tech students encounter educated believers, who are competent professionals in a technical field, and also have a sophisticated and nuanced understanding of faith and theology. Such people have a witness value even if they rarely or never address interface questions between religion and science.

9.19 Scientific empiricism is antithetical to doctrine. When inquiry leads to conclusions that contradict doctrine, one or the other is forced to give way. Church-related schools are more or less bound by doctrine, and thus are forced to reject empiricism, no matter how compelling the evidence. In short, a Catholic liberal arts college is an oxymoron. When science is useful, it is acceptable. When science is neutral, it is tolerable. When science contradicts doctrine, it is ignored, or treated as mere opinion (occasionally, as in "creationism," it is distorted). There is constant tension between science and doctrine, and I see no way around it.

9.20 The mission of a church related college should obviously be to seek and approach the

truth, as outdated as that might sound. Science is a window to truth as are other disciplines, and any institution on such a journey should incorporate science into its pursuit, but reject science's triumphalism.

9.21 Our world is increasingly science-oriented, and scientists rather than other leaders are increasingly respected. Church-related colleges should be training B.S. level scientists so that ultimately the traditional viewpoints of Christianity make up at least a part of the voice of the scientific community.

9.22 If the practitioners of science do not espouse a religion, the influence of positivism will increase due to the positive contributions of science. Religiously committed scientists are needed to serve as spokesmen for a theistic interpretation of the world. Modern science is confronted with many ethical decisions. These can only be reached from a philosophical or theological position involving values. Scientific thinking prescinds from such values. It is important for people with a religious belief to be trained as scientist so that they will be in a position to make meaningful contributions to the problems that confront us and that will be respected by scientists. The whole concept of pollution has an ethical dimension that can only be resolved in terms of value systems. Similarly, the very use of nature which involves the animal kingdom is predicated on the Old Testament interpretation that they are created for man.

10.0 Selected Responses to the Question:

Offer any other view point useful to the discussion of scientific/technological education at church related colleges.

10.1 As scientists, our main priority is to provide a first-rate education that will prepare our majors for graduate school and that will equip the non-science student to understand technical issues. The primary difference between St. Anselm and non-denominational institutions is the values-oriented environment in which we achieve these goals.

10.2 The development of critical thinking and problem analysis skills that is so essential for successful scientists is best accomplished in a setting of diverse fields of study. It would be a serious failing if the church related liberal arts colleges were to abdicate their responsibility in this area.

10.3 Modern Technology is presenting us with ethical problems and choices. The scientist in a church related college is not a theologian, but depends on the theologian to offer some answers. It seems that theological training should keep apace with Technological information and advances. A tall order.

10.4 I believe science offers a humbling perspective in so far as it does not elevate man but allows theories and other work to be overturned as new information is forthcoming. Philosophy can build systems where the intellect can roam free of constraints, yet science places one in a situation of limited knowledge and the limits of experimental evidence. Religion also can be soft in its conception of reality and lead to a primitive mind-set that is static and unfair to believers.

10.5 Ecological issues and the "new physics" are calling many to a new interest in the mystical and the religious. We seem to have come full circle!

10.6 Question #1.3 is one-sided. Of greater concern to us is how our Christian perspective can inform our understanding of science. Science describes and explains how things work. Our "religious" perspective provides insight relative to value, purpose, worth, origin of the natural world.

10.7 Extremist/fundamental colleges could very well be antithetical to open-mindedness necessary for the proper practice of science.

10.8 People are often polarized in their thinking. They feel either science is right or religion is. The barriers separating them should come done. Defence of "Turf" should be set aside and issues openly discussed in a rational manner.

10.9 We may be small, but we pack a "punch" that can be a stepping stone to a future individual who holds his own in not only science but also in communication and rational thought regarding issues in society.

10.10 Truth is instructive in any area and its knowledge is wisely governed when the holder has

a moral/ethical perspective. A church-related college should balance the secular viewpoint required by science with a spiritual one, and be prepared to withhold a mis-application of science which is perceived to be contrary to God's intention.

10.11 Scientists have a splendid window on creation at its most beautiful and awe-inspiring levels. Through that window we catch glimpses of the glory, the majesty, the power, and the graciousness of God. To teach science is to bring others to that window (and also to remind them that despite all we see thereby, we don't see Jesus.) To see the grandeur and glory of God in history in its fullness we have to look to the cross. Hearing this from a scientist *may* (just may) reach someone not easily reached by others.) This work can happen at a church-related college.

10.12 If we become so heavenly minded as to be no earthly good then our religion isn't worth much. Jesus went about doing good and healing people. How can we be effective in bettering conditions if we are ignorant of scientific and technological issues.

10.13 It seems obvious that one cannot consider one's self educated in any sense of the word without some knowledge of science. If it then follows that the institution must hire scientists to teach the sciences, it is only a small step to offering majors. Many of these departments are small, understaffed and overworked and yet they are among the most productive in meeting the educational goal.

10.14 The relationship between science and church in college education MUST be one of mutual reinforcement. The church must recognize that sci/tech education IS THE PRIMARY MODE of preparation for economic survival in the world. Even the most visionary of church hierarchy must recognize that liberal arts alone will rarely support graduate and family. The job market is technological. The sci/tech educators must recognize that SCIENCE EDUCATION WITHOUT LIBERAL ARTS IS STERILE, ISOLATING, and OFTEN ARROGANT. It may lead to good, even great, personal income and position but it will not enable the graduate to appreciate or benefit from such attainment.

10.15 Also as a way in which God reveals Himself. We have every right to study it and ought to strive to be excellent in this attempt. Although this college is limited financially, the administration is attempting to increase the faculty and monies to better assist this Division. The school is committed to a worthy program.

10.16 Science is not only a profession, it is a way of thinking and solving problems that every educated person should be familiar with. Ignorance in this area incapacitates one from making logical decisions in many areas of our daily life and in determining steps that should be taken by our government, as well as private industry.

11.0 Selected Responses to the Question:

Comment on the philosophy of education at your college as related to the Sci/Tech curriculum.

11.1 There is a deplorable lack of understanding on the part of the non-scientist faculty and administration concerning the necessity to increase the level of science knowledge of our graduates. The basic philosophy seems to be that science should be required only of the scientist and that the non-scientists can function in the world with essentially no science.

11.2 The centerpiece of the general curriculum at St. Anselm College is the Humanities Program, a two-year integrated course taken by all freshman and sophomores. The program explores the relationships between different fields of inquiry, such as philosophy, theology, history and science. In addition, all students are required to take two semesters of a laboratory science. Undergraduates thus receive training both in the methodology of science and in the human dimensions of science and technology.

11.3 There appear to be two perspectives, one a philosophical one and the other is practical reality. Philosophically, faculty recognize the importance of the sciences and the scientific method appeals to them. The practical reality of limiting the core hours for all students leads them to a compromising situation. Ultimately, it appears, the ability to verbalize a problem is more important than understanding the scientific basis of a problem. We commit all students here to the study of environ-

mental science, yet the course is superficial by virtue of necessity. Perhaps the weakness of the faith mind-set shows through. Science is perceived to be complex (as is religion) by the non-science faculty. Yet they see students and society as needing to take a stand and this taking of stands (right or wrong) becomes the critical thing in the end. If this is indeed true, I worry for society. Personally, I like to be skeptical of all things before and after I take a position, with constant reassessment being part of the process.

11.4 Our institution (Jesuit) is quite unprepared to become significantly involved in science/technology education beyond the pre-health science level. It has excellent physical facilities for that level and a faculty which is better than one would expect, but it lacks administrative experience with science as a major component of society. There is a gulf between the scientific world as it acts internationally, and the experience and aspirations of those who make policy decisions. For this reason, it is very unlikely that significant change in the level of science education can (or possibly should) occur here.

11.5 This college has historically supported science and technology, to a lesser extent, well. In general, issues involving sciences/tech are discussed in many different departments. Science and religion are largely regarded as independent here, although one can support the other in certain ways.

11.6 At present they are minimizing the importance of science for non-majors permitting only 1 lab course and one lecture science course which could be History and Philosophy of Science. They are looking for science courses on issues and not basics.

11.7 There is no consensus, there is also no demand for a consensus. There is no "Lutheran" position on issues in science and technology. I hope there never becomes one. [Time-conditioned statements on political issues are another matter]. Even here it's hard to find a way to condemn those who disagree by calling them "Un-Lutheran" or "Un-Christian."

11.8 There exists no conflict between the philosophy of Xavier University as it relates to the sci/tech curriculum. More than 55% of our students are pursuing degrees in the sci/tech disciplines. We feel a very definite need to produce individuals, rooted in our faith traditions, who will contribute to the forming of a more humane society, with these contributions being made in all possible areas of society.

11.9 a) Have a good master's program rather than a poor doctoral program.

b) Education in science is part of a liberal education.

c) Next January we shall have our Sixteenth Annual Physics Department Reflective Weekend.

11.10 Academic freedom and individual integrity of the teacher is highly prized and respected. I have taught at this institution for over thirty years. The institution has been associated with two different protestant religions and for a brief time, been independent. I have never been a member of the sponsoring church. I am reluctant to support most organized religions. Each seems to be a bit too self centered for my tastes. However, I think churches and religions have an important role to play in society and in science and science education. However, they must not inhibit science or critical thinking by closing areas of investigation as being forbidden because they are contrary to church policy. Such a move is fatal to both religion and science, in my opinion.

This has been my philosophy and experience throughout my professional teaching career. I think it is the correct one and has been, and is, the prevailing philosophy at my college. I have made this philosophy known to various administrations over the years and have never had the slightest suggestion that I change. One faculty member (in science) in the past, was counselled to keep his religion out of the classrooms and "...not confuse the commandments with the gas laws."

11.11 We have recently introduced a course entitled "The Impact of Technology on Women: Reproductive Technology". This course brings in experts from diverse areas including social work, anthropology, biology, religion, philosophy, psychology, art, literature and communications as well as a physician practicing the new assisted reproductive technology. (Partially funded by UCC). All students take 1 year of a laboratory based science.

11.12 We try to combine vigor with tolerance, but

within a broad view of the nature of man and all his endeavors, which are seen to be affected by the fall.

11.13 I have a bleak picture of education in the future. Colleges that attempt to form the complete person, particularly in the context of biblical presuppositions, will have to compete for a decreasing number of students with publicly funded institutions with low tuition, splendid campuses, and headline football teams. In the space of a generation we can become a generation of specialists who have not the least notion of where we have come from or where we are going. I trust in God's providence that the outcome will be different, and that we who have labored to pass on the torch will be permitted to have a part in His solution.

11.14 I don't really *see* what this "philosophy" is as promulgated by administrators. Where the vision is to be just "church-related" and not Christ-centered we are reduced to pushing the same secular standards as everyone else. What a sad, sad waste. If I asked you, "are you a Christian?" would you reply, "No, but I am church-related"?

11.15 Seventh-day Adventists place a heavy emphasis on healthful living. So of necessity our students need to have a good and solid exposure to science and technology subjects.

11.16 During my career I have taught at a large West Coast University, a very large state related University, a middle sized Catholic University, and at Stetson University which has a student population of 3000. There is no philosophical difference among these schools as far as teaching is concerned. We pride ourselves on the graduates in science who have gone on to many of the very best professional and graduate schools. The administration has remained out of the curriculum, and has increasingly supported the sciences with funds as available. There are no restrictions on recruitment of new faculty, and as a consequence we at present have no Baptists on the staff. I see no pending change in the future that might alter the present relationship.

11.17 The philosophy of education at our college, as related to the Science/Technology curriculum, suffers from the fact that the majority of our non-science faculty (who outnumber the science faculty) are either ignorant of the role of science and technology in a liberal arts education or are actually anti-science. Too many of them were educated during the past 20 years during which science and technology were portrayed as the source of much of the evil in the world.

11.18 The philosophy is under transition as the college re-examines its core requirements. Hopefully they will listen to the Math/Science Division and increase the Sci/Tech emphasis (it would be hard for the emphasis to get any smaller).

11.19 We have an administration that does not understand or appreciate the role of natural sciences in the curriculum of all liberally educated students. Hence we are woefully inadequate in terms of facilities and supplies and equipment.

11.20 The philosophy is great, the practice is poor with respect to the non-science/tech majors. The non-majors are very much shortchanged. There is no decent science requirement for them, and there is such a competition for students in the general education science courses that are required that no serious demands can be made on the students. The philosophy of education as applied to the majors is different. The majors get a fairly balanced education with a required liberal arts core of 39 out of 124 semester units in the liberal and fine arts.

11.21 At my institution the philosophy related to science is not on solid ground. We are in the midst of re-evaluating our goals statement, and relative to science our plan of action is not clear. The science faculty is divided as to the role research should play (undergraduate research), and what role publication should play in promotion consideration. In a Christian institution such as mine I feel that strong, if not total, emphasis should be on education for its own end.

11.22 The university recognizes the important role played by science and provides strong support for Biology, Chemistry, Physics and Psychology. It also recognizes the importance of a knowledge of science for all people and requires two (2) science courses of all students regardless of majors.

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SOME REFLECTIONS ON DR. FORD'S STUDY

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INTRODUCTION

There is a growing interest in questions involving both science and theology. The Pope has shown great interest in this area of "ecumenism." The Catholic Bishops' Committee on Science and Human Values routinely deals with questions of the relationship between science and technology on the one side and theology on the other. There is talk of a relationship between scientific and theological methodology and of the compatibility of scientific and theological thought. This is important work, but, it seems to me, it is of concern primarily to experts in such matters. The crucial work and the crucial integration is elsewhere. It is in the mind and heart of scientists as scientists and theologians as theologians. It is much more concerned with the Church's dogmatic tradition than it is with theologies. The doctrinal faith and theologies, of course, are not the same. Moreover, some theologies, both contemporary and historical, have very little to do with the Church's doctrinal tradition.

It is my contention that there can be no actual conflict between the Church's doctrinal tradition and the results of valid scientific work. There can be, are and have been serious conflicts between science and various theologies. That shouldn't surprise us, sine there have, for the record, been serious conflicts between the Church's tradition and its theologies. The most critical aspect of the faith/science apostolate, I believe, is not in the clash of philosophies of science and various theologies. The most essential element is the personal integration of faith and scientific activity in the individual in science or technology. Such an integration is necessary for one who would fulfill the personal mandate of baptism to preach the Word to all nations.

I have said this many time before, but the longer I work in the faith/science area, the more convinced I am that evangelization is the most important concern. Clearly this is the province of the Catholic and other Christian laity who are members of the scientific community. Certainly church-related colleges and universities should have a significant role to play in both the faith/science and science/theology area.

EDUCATIONAL GOALS

As Dr. Ford's papers indicate in many places, it is difficult to talk about the commitment of church-related schools to faith/science issues simply because it is very difficult to talk about the commitment of these schools to the Christian faith tradition out of which they rose. It is beyond doubt that there is no univocal understanding of the colleges' and universities' role vis-a-vis their church-relatedness.

In my experience, church-related colleges and universities are, at one extreme, catechetical schools for their sponsoring denomination or, at the other extreme, totally secular institutions still carrying the label, but only the label, of "church-related." Of course there are many degrees of church commitment in between. A clear notion of the goals and objectives of the educational institution vis-a-vis the sponsoring religion are needed before one can determine the goals and objectives of any sci/tech program or any faith/science program. I, at least, do not believe it is possible to have a good faith/science program without such an understanding of the institution's relationship to its faith tradition.

We hear and see a great deal of idealistic (as well as ideological) posturing about pluralism, objectivity, diversity and academic freedom and so on. More often than not they are simply hollow slogans designed to perpetuate the power base of an elite. As slogans, they are quite effective in deflecting any serious attempt to work out the extent of the religious commitment of the institution. As I noted above, lacking a clear vision of that commitment, there can be no serious institutional efforts in faith/science issues. Individuals with clear goals and objectives can do much, but they will most often be outside the "mainstream" of the university or college. I suspect this is a significant limiting factor in the growth of institutional cross-discipline programs in faith and science issues. There are to my knowledge very few such programs. There are

courses, but no programs. If anyone knows of such programs, I would be delighted to learn of them. I get about a dozen letters a year asking where such programs exist.

Science/theology programs are different, I believe. They are quite feasibly done by one or two people or even a team of people. As I see it, they can be done with little or no commitment to the institution's faith tradition. Theology stands to the faith commitment more or less the way the philosophy of science stands to science. Moreover, the faith tradition stands to the revelation the way science stands to the physical reality it investigates. Theology as it is generally conceived academically these days requires no commitment to the faith tradition it seeks to explain. Note that I am not saying that there can be a true theology without faith. At least in the classical definition a theologian is *fides quaerens intellectum*, a faithful person seeking understanding. Note, also, this definition does not require that the theologian gain the understanding -- only that she or he continues to seek for it out in the faith tradition, in the revelation. Certainly some of our contemporary "theology" has little to do with any faith tradition and still less to do with a personal or corporate commitment to that tradition. I shall leave it to each of you to decide how general a statement that is.

Nonetheless, I propose that any effective institutional commitment to the faith/science *mission* demands a clear statement of the institution's sense of its purpose and objectives. It does not seem to me that such clarity is generally available these days. I am open to being convinced otherwise. In fact, I would be quite heartened by evidence of the contrary.

Moreover — maybe my remarks are valid only in educational institutions I know about personally — "pluralism" is a deterrent to any serious faith/science work. Again, I am limiting the validity of these remarks to just the few institutions I know well where "pluralism" is a synonym for a lack of clear commitment to Christian (in the specific cases, Catholic) learning and particularity. It seems to be a word to hide behind in the pursuit of some abstract truth -- Christianity can never truly be abstract -- or some necessary rationality -- Christianity cannot be *necessary* either, since Christ's presence to us is a gift.

Perhaps my idea of "pluralism" is idiosyncratic. To be of value in a pluralistic society, it seems to me, a particular institution should be anything but pluralistic. It should stand for something very definite, related to its own purposes. If that is the case, a Christian institution should be clearly Christian. If the institution is itself pluralistic what new does it contribute to a pluralistic society? It simply ratifies what other particularly committed organizations have been able to insert in society. Thus, instead of adding to the cultural mix, a "pluralistic institution" simply rubber-stamps what others have contributed.

Again on a rather negative note, "pluralistic" colleges and universities are rarely open. Indeed, in those I know well, the "openness" they proclaim does not extend to all in the university. They are hotbeds of elite "correctness." Refusing to bow before the reigning *Zeitgeist* is sure to bring a swift marginalization. It seems that the more "pluralistic" such institutions are, the less room there is to publicly profess the faith tradition out of which the institution grew. Again -- we'll let me once and for all state that I'm writing out of personal experience, not generally -- there is far less freedom to defend the old institutional commitments than there was in the past to teach other views. In brief, in a pluralistic institution, tolerance is a one-way street.

This reflection, however, is not meant to be a diatribe against pluralism or diversity. It is merely meant to state that institutional confusion on goals and purposes sounds a death-knell to serious programmatic approaches to faith/science issues. If the *faith* side of the approach is confused or is only a half-commitment, then the entire project will be confused and not worth the effort.

I would rather discuss the potentially profitable aspects of a committed faith/science program, one in which all the participants are firmly dedicated to their Christian faith and are fully dedicated to their science as well.

FAITH/SCIENCE PROGRAMS

The integration required in such a program is not some methodological unity nor a rationalistic integration. It flows rather from a realization that there cannot be a conflict between a belief in the *ex nihilo* creation in Christ and the world so

created in Christ. As I indicated earlier, this is not a drawing closer together of a science (more exactly, a philosophy of science) and a theology. It relies on the very basic understanding that Christianity is not a cosmological religion (based on some necessary rationalism) but a historical religion (founded upon the sacrificial life, death, resurrection and continued sacramental, Eucharistic presence of Christ in creation).

In brief, any successful faith/science program must rely on the commitment to Christ in a world created in and for him. It must be a lived program, not merely one dedicated to a more or less exotic intellectual approach. A program like this is not likely in many church-related colleges and universities. It requires too high a Christian profile for many of them, especially for the larger college and university milieu. I am not being deliberately cynical here. This is a sober description of my more than two decade experience in science/theology work.

Courses and research in science/theology are important in helping us discover where we are and how we got here, but they are at best "food for the mind." While necessary, this diet is far from sufficient. What a program must produce is "food for the mind *and* the heart." We rarely operate in our everyday life solely for intellectual reasons. Here, it is profitable to recall St. Augustine's observation that our actions flow out of our deepest loves. I am suggesting that any motivation for our work in faith/science must flow out of love -- out of love for our science and even more out of love for the created gifts given us by our creator and redeemer, the Lord Jesus Christ as well as our love for God himself. No other motivation will suffice or will be fruitful.

I do not disdain science/theology work. It is a necessary part of a larger faith/science effort. But I personally see it only as a *part* of the larger task and not *the* most important part. The most important aspect of the faith/science effort from the Christian side is faith and an understanding of the doctrinal tradition — in my estimation.

In other words, any serious and fruitful work in faith/science must be a vocation, not an intellectual hobby -- and must be taught and, more importantly, lived as such. Only in this way can we show how serious we are and how deeply loved. I would not have said the above twenty years ago when the intellectual approach was far more important to me than it is now.

Can such a program be established in church-related schools? In some smaller colleges I think it can. In some of the smaller colleges I know I believe the faculty is present to do so -- from a sense of vocation and love. In fact, several of the participants at the October, 1989 ITEST workshop spoke in terms much like those I used above. In the institutions they represented I believe such a program could well flourish. In the larger colleges and universities -- especially those who have chosen the path of prestige rather than a serious search for truth, goodness and beauty -- intellectual pretensions would get in the way. In these institutions faculty recruitment is usually a search for big names or lengthy publication lists or ideological compatibility. In such institutions a vocation in faith/science is unlikely.

Worse, such prestige-burdened institutions rarely see any importance in faith/science work. For them the trendy is a command and faith/science work is certainly not trendy. Moreover, it calls for a freedom of spirit that is impossible in an institution whose great speaking point is "academic freedom." I believe that the readers of this article are aware that the "academic freedom" slogan applies only to "freedom" from criteria imposed by an agent external to the institution -- like the church. It certainly does not apply to what goes on inside the institution where only the regnant elite is free.

Paradoxically, then, I think there is chance for such a program (such a vocation) only in those institutions of higher learning where the connection to the founding religious tradition is strong. Where the institution's great goals are pluralism, multiculturalism, diversity and "being on the cutting edge," the trendy are in charge and what is now called "political correctness" is the orthodoxy to be preserved.

In short, for a fruitful program -- one that actually affects people's lives and behavior -- belief is clearly as important as knowledge. In fact, I believe that it is prior to knowledge. In my present understanding of this work -- actually, this apostolic mission -- the foundation is belief, the goal to be sought, but never attained in this still being-redeemed world is understanding.

Let me consider such a program a bit more systematically.

As I have stated, faith tells me there can be no conflict between the Good News (the New Covenant in Christ) and the universe created in Christ. If there were, then either the creation in Christ or the revelation of Christ as Lord of history would be false. That's a step I cannot take.

If this is so, where does the historically factual unease (and outright conflict) between science and theology come from? I would suggest a reading of Christopher Kaiser's recent book, *Creation and the History of Science* (Grand Rapids, MI: Wm. B. Eerdmanns Publishing Company, 1991) for a survey of about 2200 years of relationships between science and Christian and Jewish thought. (A survey like this reveals a good bit of the struggle without getting bogged down in details. (I plan to do a review of Kaiser's book for the spring Bulletin. In the meantime I recommend it to you.) Basically the struggle has involved a necessitarian logic. It is a conflict based on cosmological rationalisms which claim to be autonomous. Since the basic character of the covenant in Christ is freedom, there is bound to be a conflict between a necessitarian science and Christianity. The same, however, is true of a conflict between the Christian faith and necessitarian theologies.

Any fruitful Christian approach to science (to anything, in fact) must be grounded in the free creation in Christ. Creation *ex nihilo* is a gift, it involves no necessity whatsoever. Our approach must be that of St. Paul in the Colossians 1 hymn:

> He is the image of the unseen God and the first-born of all creation, for in him were created all things in heaven and on earth: everything visible and everything invisible, Thrones, Dominations, Sovereignties, Powers -- all things were created through him and for him. Before anything was created, he existed, and he holds all things in unity. Now the Church is his body, he is its head.
>
> As he is the Beginning, he was the first to be born from the dead, so that he should be first in every way; because God wanted all perfection to be found in him and all things to be reconciled through him and for him, everything in heaven and everything on earth, when he made peace, by his death on the cross.

This citation has many elements that are crucial to any work in the faith/science area, even in its academic phase, which we cannot forget is only one aspect of the larger area. Paul talks about creation in Christ and reconciliation through and for him. In the academic part of this set of issues we must learn and teach that the creation is in Christ and draw out the staggering implications of that statement both for our understanding and for our daily living. If we don't do this we're not facing the real issues involved in the history of Christianity or of science. We also have to face the issues of the reconciliation and recapitulation of all things in Christ. Many contemporary Christians would, unfortunately, see that as triumphal. Be that as it may, these are basic (thus, indispensable) aspects of Christianity.

I would suggest, moreover, that the faith/science program in colleges and universities must be more than a theoretical discussion of where and why faith and science seem to be in conflict. It should also contain, I believe, a serious approach to being Christian in the scientific and technical communities. Of course, many church-related institutions seem to be unwilling to approach being a Christian in the contemporary world. There's no reason to think they'll be helpful in this significant apostolic arena.

The question we must cope with squarely and honestly is whether church-related colleges and universities are willing and able even to approach this kind of education. I realize that "church-related colleges and universities" is not a homogeneous grouping. If we can identify some who are both able and willing to pursue such a program, I believe it is incumbent on ITEST and other such groups to help, to the extent of its resources, in whatever way the institution might desire. Clearly, this help must be in human resources, not financial ones. I believe we might legitimately imagine an apostolic bond between such church-related institutions and organizations dedicated to a truly Christian response to our growing understanding of our universe and ourselves.

My current appraisal is that the faith/science *mission* is possible only in institutions of higher learning that still carry a firm commitment to

Christian faith. In any others, I believe, the attempt is not worth the time and energy of either partner in a faith/science adventure. As I said earlier, I would truly welcome evidence that would convince me I'm wrong. I would rather be incorrect about this than correct.

OTHER POSSIBILITIES

I see two groups of scientists who must be considered, other than those teaching or studying in church-related schools. They are, of course, those teaching and studying in secular colleges and universities and those already expert in science who are working in industry and government. Let's briefly consider them in order.

SECULAR CAMPUSES

Most probably, the largest percentage of Christian in science have been and are being trained in secular educational institutions. The only likely source for any even loosely organized approach to faith/science work on a secular campus seems to be campus ministry programs. Here, fruitful programs could be established to help both Christian faculty members and students understand better their Christian duty to be a leaven in the scientific and technological communities. Unfortunately, from what I have perceived in Catholic campus ministry programs, this is not at present a very sturdy reed on which to lean. I just today (9/20/91) received a letter from a campus minister who is involved in this kind of a program. He wrote: "I continue to be discouraged by the lack of response from campus ministers regarding the question of the relationship between faith and science. They just don't seem to see this as a part of their ministry. In every regional or national meeting I attend, I try to chip away at the issue, but I don't find a lot or results. Perhaps what we are doing is sowing seeds and the watering and growth will be up to the Lord."

Of course, the growth of the church and of its apostolic works is primarily the gift of the Lord. Each of us should first pray for his ever-generous help in this mission. But it is our duty as well to do what we can to help the Lord's plantings to flourish, as this one campus minister is doing.

We need much prayer and thought and, of course, action to begin to develop ways in which faith/science work can grow and flourish on secular campuses. I believe this has to become a much higher priority for ITEST and other faith/science groups.

GOVERNMENT AND INDUSTRY

How can we help Christian in science who work in government and industry develop a deeper sense of mission? One possibility is the local congregation or parish. Like campus ministry, however, that is presently a very slender reed. Most religious leaders, including pastors, seem to show little understanding of the depths of the need for faith/science work. More, very many of them have not been prepared to handle the questions and opportunities raised by science and technology. Yet, for many Christians in science the congregation or parish is the only Christian organization in their lives. Somehow we must try to devise ways of making faith/science a viable parochial entity.

At least in Catholic parishes, the problem is exacerbated by the tendency for scientists not to identify themselves as such to their pastors. As I sit here and ponder what might be done, the idea of "parishes for scientists" flashes through my mind. Although this could be only a partial answer because of geography, there clearly are places where this could be organizationally feasible. If any of the church leaders who read this have any observations to make on such a parish, we would welcome them. I'm sure there are problems with such an arrangement of which I'm unaware. But could it be made to work?

A couple of years ago ITEST sent a mailing to every Catholic parish in the country (over 18,000) asking the pastor to put a small ad about ITEST in the parish bulletin. We thought that those scientists who go to Mass would be likely to read the parish bulletin — at least during the homily. It seemed like the most efficient way to get to our audience at a relatively minor cost. As best we can affirm, fewer than 50 pastors printed the ad. There may have been more, but, of course, we could not monitor each parish bulletin. It was a discouraging effort. Yet some way must be found, because a significant area of the church's mission is at stake.

SUMMARY

The ITEST Board of Directors is more and more aware of this particular area of concern in all three

of its aspects, church-related schools, campus ministry programs and parishes. The Board will hold an extra meeting on November 23, 1991 to begin to develop strategies for a stress on the evangelical mission involved in faith/science work. I invite any of you with ideas on any or all of these aspects to get them to ITEST (221 N. Grand Blvd, St. Louis, MO 63103) by then. I can assure you they will be welcome and will get serious attention. This, to be sure, is an ongoing commitment of ITEST and November 23rd should not be considered a deadline. We can use any and all "ways-and-means" help.

Also, ITEST would welcome longer and more thoughtful pieces (both pro and con) on the content of this Bulletin. We will be very willing to publish them in upcoming issues of the Bulletin and, if there are enough of them, to prepare a special publication on this matter. We do not suppose that all of you will agree with all (or maybe even any) of what is said here, particularly with my reflections on Dr. Ford's surveys. We assure you we are looking for reality here, not for some ulterior ideological superiority. ITEST wants to serve the Christian churches as best we can in the faith/science arena. To do so, we have to deal with the "real world" of faith/science effort and the real needs of the churches.

We need your help, your wisdom and your commitment to your intellectual discipline and especially to Christ in the church. In anticipation of your active support of this work, we thank you for your help.

A RESPONSE TO "THE CARBON DIOXIDE PROBLEM AND YOU" (Summer, 91)

Mr. Rex S. Kochanski
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When Mr. Hannan called upon "supposedly informed people" to combat the carbon dioxide problem (Bulletin, v.22, #3) the irony was crushing; for his letter seemed to be simply packed with "supposed" information. It closely follows a style of argument satirized by G. K. Chesterton: "Professor Gubbin's remarks are, of course, outdated in these days of wireless telegraphy and aerial swine." What cries out to Heaven to be proved is assumed; the question is begged, whether the question begged is flying pigs, or fizzing drinks - drinks that can melt, not only ice cubes, but ice caps.

Now, it is true that Mr. Hannan did not treat the carbon dioxide content of a can of Coke, and its catastrophic consequences on Arctic icebergs. However, the facts cited struck me as having a similar degree of relevance. Here is a summary of points which can be easily verified.

We are given the statistic that an exhaled breath has a higher carbon dioxide content than the atmosphere, and so we are "constantly contributing to the problem." It would be very well, however, to reflect on the fact that the volume of the atmosphere is not quite the same as that of your lungs. Similarly, we should be aware that neither grasslands nor rainforest consume nearly as much carbon dioxide as do phytoplankton. Perhaps we should dump phosphate detergent into our local pond to grow algae to help ward off global doom? That seems more effective, at least, than cutting down on the use of herbicide without being sure whether it leads to a net gain or loss in photosynthesis!

Let me be clear. I am a cell biologist, not a climatologist. I do not doubt that an (increased) greenhouse effect *could* cause problems, or that the aggregate of our individual actions could significantly affect the outcome. However, I hope I will not give offense by suggesting that, if Mr. Hannan hopes to convince more-than-supposedly informed people that carbon dioxide is a pressing personal problem, more serious thought *is* in order - on his part!

MEMBERSHIP DIRECTORY UPDATE FALL, 91 - WINTER, 92

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