

Science/Technology Education in Church-Related Colleges and Universities

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Session 3: General Discussion

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Session 3: General Discussion

FORD (NY): In conversations and letters, Fr. Brungs talked about a possible conference which may follow in 1990 or 1991. During the day, we ought to keep our eye on that target. Where can we go from here for the 600 or 700 church-related colleges committed to science education in one form or another? Should we have an event later that touches a larger audience of institutions? If so, how do we approach it? I think that that has to come up front, because it may help our discussion this weekend. Do we want to do that? Are we the mustard seed? Do we believe we can influence the rest of the church-related colleges? If so, how and what are the problems there?

BRUNGS: We see the opportunity to be wider but we need the vision and wisdom of this group. Should we be looking beyond church-related colleges and universities to church-related schools in general, K through graduate school? Would this be too difficult to handle? Should we look to more than one meeting? Can we have success at the college and university level without accompanying success at the lower levels? We must look ahead 10 to 20 years. I feel that, if this effort ends with the closing of the conference, we've wasted time, effort and money.

BERTRAM: I gather that by feasible, you're not simply asking if it is administratively feasible -- could money be raised and so on.

BRUNGS: No. Is it something that we ought to do?

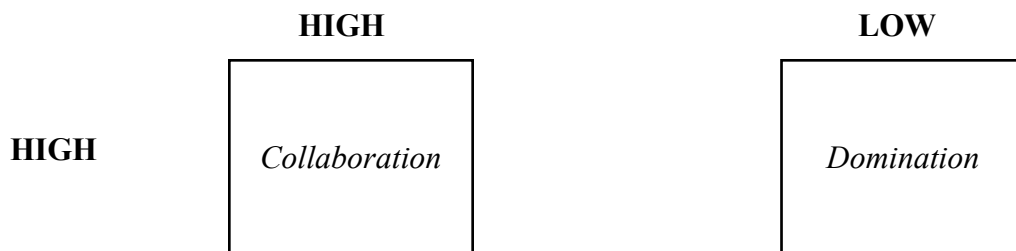
BERTRAM: Something that a conference could help resolve? So far I've detected a strong consensus about doing something, less about what to do.

FORD (St. Louis): Fr. Panuska emphasized in his talk yesterday that it's God's creation that scientists are looking at. Several of the papers have touched that note of encouraging curiosity and wonder at God's creation. God's creation is urging us on in scientific investigation. In offering a sort of challenge or critique, Dan McLoughlin alluded to the story of the fruit of the tree of knowledge and of eating the fruit thereof. I refer to that same parable. We are Christians investigating this world; Adam and Eve were "Christians" whose wonder and curiosity, if that's what did it, caused them to pick the fruit off that tree. Is there, from a Biblical perspective, something tragic or dangerous or problematic in pursuing knowledge? Is it a mixed blessing?

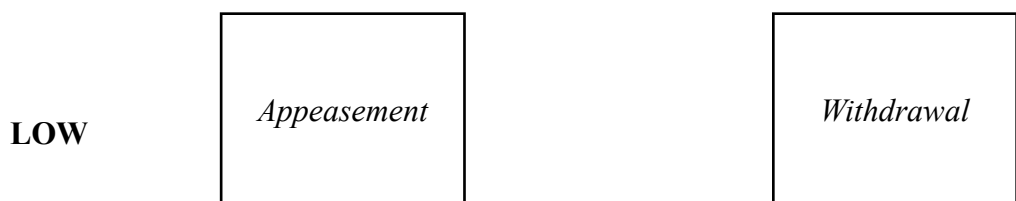
SHEAHEN: I think probably everybody's been to management training at one time or another. There is a system in which our self-image and the image of others form these brackets or these little quadrants. (see below). If we think highly of ourselves and highly of others, we engage in collaboration with them. If we think highly of ourselves and poorly of others, we will engage in domination; poorly of ourselves and highly of others, we will engage in appeasement. If we think poorly of both ourselves and others we will withdraw. In the middle is the area of compromise.

It is perhaps a prerequisite for our concerns to locate ourselves on this map relative to the secular universities. If we say, "Stanford and MIT have all that great equipment; we can't compete with them," we're putting ourselves here (low) and them here (high). If we put ourselves in the low box, we invite the other to go into the high box because we say: "Hey, you're good" -- a high image of the other, a low image of ourselves.

IMAGE OF OTHERS



SELF IMAGE COMPROMISE



If we apologize for our religious back-ground or our religious faith, we're going to wind up in this category (appeasement). Everybody wants to be in the collaboration box. It is certainly possible to engage in collaboration with the finest research universities; and, if you think about it, we don't have much to apologize for. If you look at what the secular humanists have achieved with the United States in the last 20 years, you see they've done a lot to put themselves in the low box. Some of their great plans and social engineering efforts have been gross flops. Every now and then you read that they're rethinking their ideas. Religiously affiliated universities and schools do not have to apologize nor be down in the low box. We can play the game on a high level and deal as equals with the major universities in research on the secular side. If we keep this kind of principle in mind, we'll have a much better agenda for this conference.

PERRINE: As I get older I become more aware how lovely little molecules are. Each one is a little greeting card from God. I've gotten some beautiful, charming crystalline kisses from God in the form of little molecules. We might have a more positive effect on our kindergarten and grammar school and high school students in religiously oriented schools by telling them that, if they want to find God, they could try studying chemistry. Some find God in chemistry, others find atheism. Some find God in religious life, others find atheism. We could go into grammar schools and high schools, saying, "if you want to be a mystic and find God, go into organic chemistry." We now say, "if you want to get a job, do this," or "if you want to solve a great national need, study chemistry." Who wants to solve urgent national needs? Many people deep down do want to find God. Many of the great scientists did that. Albert Einstein had great wonder and awe -- granted he didn't find official religion -- before God in the universe.

I don't agree with these things about the tree of knowledge being ambivalent and perhaps our getting evil out of it. If it is, it's we who create the evil in it. It's not in the knowledge itself. God made us to discover that.

ORNA: I too believe that the search for truth is not inherently evil. There is no bad in that at all. The evil occurs in our attempt to make ourselves God. That's where the problem lies. I agree with Dan that faith and religion are two different things. One can be very religious and live without faith. Yet one can live a great faith-filled life without any kind of an overt allusion to religion. I'd like to separate those two concepts.

YACKEY: I'm in biology with a strong bent toward environmental science. I'd like to mention the point of the story that God took the garden and said, "Take care of it." I'm interested in stewardship. That's the aspect in science that I brought along, namely, the stewardship and taking care of the resources. I try to get a few concepts across and some biological principles in the broader vision of stewardship. Once in a while we speak somewhat covertly of faith in that. There's that underlying core of caring for this fragile earth and resources of the earth, which I think puts the emphasis on that first part of that Biblical story.

COLICELLI: We educators have to be careful not to overwhelm people with problems. I have trouble falling asleep worrying about acid rain, the greenhouse effect and a number of other really critical issues which could possibly make life impossible. Still, my basic gut feeling is that we're going to survive. But we have to be careful when we talk to students. We have to teach them appropriate issues. Otherwise they can become numb. That's the only problem that I can foresee in terms of approaching the tree of knowledge is that we numb people. That has happened on the nuclear issues. There are a lot of people numbed by the problem. It does overwhelm.

I want to make some remarks about any upcoming conference. An interesting concept for a conference would be core curriculum, because then you pull in different people. Let me give an example of working on the core curriculum -- I give the example that I always use at my college. I'll say to the English faculty or the English faculty will say to me, "Well, we certainly don't want anyone to graduate from the College of St. Elizabeth without knowing what a sonnet is." Of course, don't be silly. And of course, I know what a sonnet is. I suspect that most of us here have more than half of our 100 and some odd credits in undergraduate education in areas other than science. This can't be said for everyone else. I always say the scientists are really the only liberally educated people in our institution. So I tell the English people that I don't want anyone graduating from the College of St. Elizabeth who doesn't know what the major air pollutants are. Well, of course, the English faculty doesn't know what the major pollutants are. So all of a sudden, dialogue stops.

In New Jersey we have had success in global education. But we've had to educate the faculty. We've had to have them do more than talk about the problem. We've had to bring in experts to teach them. The humanities faculty doesn't know much about science. Our elementary education majors tend not to know much about science and math. They go out and create new generations of people that don't know much about science and math. Dr. Ford's (NY) study showed that we all think that people don't know science and math coming in. Somehow we have to break the cycle and we have to break it with knowledge. There are programs where scientists are teaching science to the teachers. We can talk about the problem, but the bottom line is that we have to start teaching colleagues, teachers and everyone else. NSF which is becoming freer with money for this. Here we're all believers. The problem is that, if we had a conference, how would I get this English faculty to get on the plane with me to come out here. They're going to feel pretty lost.

SEIBERT: A lot of people question where genetic engineering is going and how it should be done. I agree with Mary Virginia (Orna) that the scientific information we get is certainly not evil. The question is what do we do with the information. Take the splitting of the atom. There's no reason why the atom shouldn't be split. It's what we did with the splitting of the atom that certainly was immoral. The same thing could happen in genetics. We should question where we are going in recombinant DNA, as the biologists did when genetic engineering first began. "Should we really apply this? Ought we to do everything that we can do?"

EAGAN: I want to pick up on Tom Sheahen's matrix there on the board. It raises a terribly important question in terms of a plan that most of us would like to see develop in the future. To sum that matrix up, it is true we are what we pretend to be. We must be very careful about what we pretend to be. If we pretend to be fully in the matrix of research at those colleges and universities, we're going to have to make a terribly important decision as to whether or not a future conference focuses on church-related schools or institutions, or conversely colleges and universities that are church-related, because there is a fundamental distinction, I think, to be made between the educational process as such.

Legitimately we could go either way. I'm not suggesting we do one or the other, but it's an important consideration. If we pretend to go the route of becoming first rate research institutions, scientifically and technically oriented, we have to do what those other institutions do. We have to cooperate with them. I'm not sure to what extent a conference that just focuses on a whole educational or pedagogical scientific and technical educational process would lead towards that. It's a decision we're going to have to face if we take seriously that church-related colleges and universities ought to be first rate institutions where the integration of science and technology and the humanities takes place.

BARNES: It's encouraging to hear all the scientists say positive things about the relationship between science and religion. I think Elena (Collicelli) and Ford (St. Louis) are correct about the division. I see a lot of theologians carefully isolating or quarantining science, praising it for doing its thing but trying to make sure that it cannot impinge on theology. Some philosophers of science say science is just a particular language game that is a kind of faith and a myth of its own. They say that it follows a sequence of paradigms with no real validity, and it is dependent simply on social pressure. This is a pretty powerful philosophy for a lot of theologians. Avery Dulles, a Catholic theologian, Lindbeck from another tradition, say that it's okay for people to continue with their religious beliefs untouched by science because the two are entirely different kinds of things. If we're going to have a conference on religion and science meeting at the college level, that's one of the problems that will have to be faced.

CONNELL: I want to respond to this. I think that's always been a problem. Last night someone brought up Nieuwland. There was also Zahm who wrote a book on evolution which he was asked to withdraw because the church wasn't ready yet for evolution. I really wanted to respond to Charles Ford (St. Louis). In some of the translations -- I'm not a Biblical scholar -- you still have "conquer the earth." To me, that means conquer the understanding of nature. Research will enable us to understand the physical and biological world. This is a part of what Adam and Eve were told to do. The other quote I use often, -- though I don't say it quite as Irenaeus said it -- is: "The glory of God is man and woman fully alive." If we do not use our intellectual potential to study the world around us, I don't think we can be fully alive.

FORD (NY): We use the term church-related. It struck me, in laying out the study and identifying the schools, that I automatically eliminated the Jewish community. Now my world is Jewish.

BERTRAM: You had Yeshiva in your paper, didn't you?

FORD (NY): Yes. But overall, it's really a Christian based study. At any future meeting, I certainly would like to have some of my Jewish colleagues, particularly those who are Orthodox and who are clinicians and scientists, participate in this discussion when and if it occurs in 1990 or beyond. After all, they wrestle with God by definition on a daily spiritual basis. We're wrestling with God as well. We would sell ourselves short not to have that very strong fine tradition. Where we have great commonality with the Jewish tradition, all of our discussions should be Judaeo-Christian.

Further, to expand the ecumenical perspective, I happily live near Yale and benefit from that fine university. Yale is a very Catholic university. It's a very Jewish university. It's filled with a lot of believers. If you follow its activities, some of the most exciting things come from Hillel and Newman Centers. So let's look at the Jew and the Christian in the secular university who also lives in the same universe. We might go beyond the concept, church-related.

BERTRAM: The example of Yale also brings up Michael Barnes' reference to Lindbeck, who stands on the other side of the very issue that you're talking for.

SMOLDERS: So much is being said it's difficult to respond because everything brings up another thought. In southern California we started what is called a southern California colloquium on religion and science. It is made up of Jews, Moslems, Orthodox, Catholics, Christians. It's fascinating. We started with presentations by specific scientists who talk about religion and science.

I'm disturbed because I see a greater separation of the liberal arts from science. I see colleagues trying to degrade science. They don't want to listen; they block it out because they don't understand it. When this topic was announced -- I'm sorry to say this was the first time I had ever heard ITEST -- it was sent to our president. He sent it to the chairman of the religious studies department, who mailed it to the dean of the College of Science and Engineering. I looked at it because I am in charge of our science and technology program. I thought it would be a great thing since we have a core curriculum review committee. I hoped to get somebody from the liberal arts to come with me and bring back these ideas to the Dean of Liberal Arts, who is a Jesuit. He said: "Oh, another one of these. Just a waste of time, energy, effort and money." When I told him I'd pay for it, he said that no one in the college would benefit from it. That disturbs me. I admire what you are doing.

I wish I had the time to go into the high schools, since we need to instill enthusiasm for science at the high school level. But I don't think a conference is going to do it. I think we should go out and spend time. We all should go into a high school and help to get these students enthused about science. The latest issue of the *American Scientist* noted that the number of students interested in science is down. Young people don't want to go into science. I don't know why that is. My colleagues are afraid of science. They're afraid of graphs and statistics. I don't think it applies only to church-related institutions. Its cause is, I think, the separation between science and the arts or philosophy. The gap is becoming wider. Church-related or not, we need to educate people to realize that science is important. I loved what was said about finding God in science.

RECK: This question may betray my own lack of background in science. I'm from the humanities side, with much more experience in theology and pastoral work. It was suggested yesterday and this morning that the question basically is concern for values integral somehow to scientific research and education. If so, how does it enter in exactly, at what point? Is it something around this question of responsibility? Several people mentioned finding God in their scientific research or their scientific life. Where exactly does it enter? How can one who's teaching theology to a group of technologically inclined students hopefully get in touch or recognize this entry point? Or, on the other hand, is the problem, as several also have suggested this morning, largely one from the point of view of the humanities? There seem to be many more scientists interested in this dialogue than people in the humanities. They either don't know the sciences or they're afraid to try to bridge the gap. Where does this concern for values enter in?

BRENNAN: Because I'm a student, among the other hats that I wear, I also wear my ignorance well. I hear people talking about education and sciences being means and ends unto themselves. I realize that part of what we're talking about here is the role of technology education by the church-related schools in order to approach science and technology. How does theology play into this whole question?

St. Louis University just had a meeting about the mission of the university. We talked about what it means, how we are going to cross disciplinary boundaries within the university. We're not talking about collaborating with other universities but just trying to get our own act together. I'm sure that there are other schools which face similar problems. We've talked about questions that we can address from many different areas. What are the pressing questions where we can draw resources from theology, from different sciences, from technology? Someone from the humanities department suggested that a great question for us to work on together was what Henry VIII really died of.

Working in a school, surrounded by some of worse poverty that I've experienced outside of Milwaukee, I think that there are pressing questions for the solutions of which we might use our science and technology. Let's develop some means to build this kingdom of God to alleviate some of these problems and injustices. Education for many of the students at Parks, as I understand it, is not an end in itself. It's a means to a career. Many of our students typically earn \$35,000 when they walk out the door with a bachelor's degree. I don't believe that we're offering that same kind of salary to people who have doctorates starting out in theology. The question is where the buck is.

The Ignatian anniversary year is coming up in 1991. A conference, bringing together people from kindergarten through graduate school through post-doctorate, may be something that would interest people outside of education. It might interest students and people in the community to see an application of some of the wonderful things we have which might help solve some of the problems society has missed. Perhaps this might draw interest from outside the immediate university and college community.

BRUNGS: Unlike Dan Perrine, I have never found anything in chemistry except dirty dishes and bad smells. Now physics is another thing! There are two areas where we can begin to work with technological students. One is Dan Perrine's notion of beauty. A good engineering work is beautiful. I'm always impressed by the beauty that the Golden Gate Bridge adds to the Golden Gate. I think the gate itself is more beautiful for having the bridge across it. More and more I'm of the opinion that we cannot worship God except in a world God created. Only in the one He did create, only in the one in which He became incarnate can we worship Him. This world is the world in which science operates. There are a lot of other operations going on that are just as important. But science is an area of enormous importance, not for value, not for things other than the fact that the world Christ became incarnate in is a world capable of producing computers and the minds to build them. It's a world that is already 15 billion years old when we came into it, give or take 2 or 3 billion years.

I work on the assumption that church-related schools are related to the church. That may not sound profound, but we really haven't talked about the church's need for science in order adequately to proclaim the Good News in the only universe that exists. In order to proclaim the Good News and in order to live it, we in Christ -- in the only world there is -- have to love, understand and manipulate the creation. I'm using manipulate in a positive sense. We reshape it. Science is an important vehicle for doing this. It's not enough to talk about ethical values. This is, I think, Michael's (Barnes) point with respect to theologians. This is not something that theology can ignore. This is not something that Christianity can ignore.

I could be wrong on this but, as far as I know, Christianity is the only major religion that started in a city. It's an earthy, urban religion, and it's centered on the creation. To worship God fully, we have to do our best to understand the world God has given us to worship in. Until we can get this stuff into our doctrinal understanding, I don't think any discussion about values is worth anything. They have to be concomitant. They have to proceed together and work on each other. We must have a scientific understanding of creation.

I remember reading one of Teilhard's letters (ca. 1910), which I haven't been able to find again, in which he wrote that the Catholic church is the world's largest organization without a research and development operation. That was written a long time ago, but I think the statement is basically true. This is what the Pope is expressing in the book that Jim Skehan mentioned, the need for commitment to scientific understanding in order to increase our understanding of what God has done.

SKEHAN: I'd like to follow up on Don Reck's point about where we insert the question of values into engineering and technology. Although it may not be a common thing in science classes to talk about values, it is becoming more common. We do look toward the implications of science and technology. Students are concerned about who they authentically are. So I think the question of integrity is very much at issue in every kind of scholarship and in every discipline. This is particularly clear with regard to science where we are trying to understand the outside world and the universe and to be in conformity with it. What is conformable to our humanity? As Lonergan says, it's the transcendental precepts, namely, attentiveness, intelligence, of being reasonable, responsible, and in love. That is a measure for Lonergan of how you match the individual to what the individual is learning and professing in the outside world. I would say the question of integrity and authenticity is possibly the place where there's a meeting point.

TRUCHAN: I have three comments which sound disparate but which are related. In terms of a future conference, we have to look seriously at another model -- and I'm not saying it's either/or -- which would deal with those who are not the converts. If we could come up with a package or several packages of workshops, we might create a very interesting application effect. I wear a number of hats in many organizations. I'm sure that would be true of

everybody in this group. If we have a package of materials for organizations A, B, C, D, E, F, of different natures, we may be able to create something very interesting. That does not exclude the major conference. It could be an outcome of it. At least it would address the issue of how we could get to other audiences to convince people that this might be worthwhile. I'm thinking of STS, the work of Rustom Roy and others. That's a natural forum for us too.

We who work in church-related institutions should be people of hope in the present and the future. We seem sometimes to forget that. Yet that is one critical thing society needs. In our institutions, values must be taught in all disciplines. We're outcome oriented institutions. I teach values in microbiology. I not only teach values, I assess the values for them. If anyone is interested in doing it, I'd be glad to share it with them.

I just gave the DAS (Draw a Scientist) test. I don't know if you know how that works, but it's very revealing. I should have brought them with me. I gave it to students in a science methods class and had them give it to children. They brought them back and we evaluated them against criteria. Even first graders have very strong myths about what a scientist is or is not. They fall into two categories that are very germane to what we're saying. They are male, with a lab coat on, with lots of hair and glasses, and eccentric looking. I'm serious. We're talking imaging here. We may consider ourselves liberally educated but our colleagues consider us eccentric. We have to address that issue among ourselves. Collectively, not necessarily individually, we lack social interaction graces. I can give many examples of that. It's worthwhile seeing this test. The drawings came out into two categories. The bulk of them were the eccentric male scientist thing. The others were not human; they were strange space creatures with horns and things like that. That says something to me that portrays a strange perception of the "mystical. I did this work about four weeks ago, so I'm talking about very current data.

Finally, I'm concerned about all this multiplicity of ideas that are coming out on the floor and how we're going to focus it. I would like to suggest that we break up into small groups and try to focus it. Then one person can report it to the plenum. That might help us come to some kind of conclusion in terms of whether or not we want a major convention and what other things would be included. We could spend the next hour adding wonderful things and not be any closer to a decision.

SMOLARSKI: Last year I was at the convention of Sigma Xi, the National-International Science Research Society. The main theme was the public understanding of science. I was fascinated by the presentation of a government official for science, from Australia. He brought up some of the same points that Sister just mentioned in terms of the public perception, especially of grammar school kids. They thought that scientists do secret and very weird things. If you reflect on the popular understanding from the movies (*War Games* and *Weird Science*) you see the culture we're dealing with in English speaking countries. That's not the perception among the Koreans, Japanese or Vietnamese. They see science as a high value, whereas the Anglo Saxons do not.

We could do some housecleaning ourselves as we search for unity and collaboration between the science half and the arts half o/f an arts and science college. For two years I was president of the local Sigma Xi chapter at Santa Clara. I'm discouraged when maybe six scientists out of a faculty of 50 show up for a Sigma Xi lecture. If you bring in a mathematician, a few mathematicians may show up, but nobody from the other sciences. We've become so specialized within science that we can't understand other scientists. I can sympathize with the English person who doesn't want to come to a science talk, but I'm not sure why some of the other scientists might not want to come to a broader scientific talk. But that is a concern even within a small number of science departments. We don't do that good a job of collaborating among ourselves. Perhaps if we did, we could collaborate among other factors in universities.

Take the scientific research done in church-related schools or by church-related individuals. The Jesuit Studies group at Fusz (St. Louis University) published a book about an early Jesuit mathematician. I gave a copy of that to my chairman who said: "this is great, but what has happened in the last 200 years?" Have we reached the plateau Rustom Roy mentioned, namely, that there will be very few significant types of discoveries in the future? When people hear of Santa Clara, they think about the great glory days of football when we went to the Sugar Bowl and

the Orange Bowl a long time ago. Scientifically, Santa Clara had a professor who made the first manned flight (by glider) before the Wright Brothers. We had a Fr. Riccard who did great things in predicting weather by analyzing sun spots. Nobody ever hears about that. They think about the glory days of football. But that was in an earlier day when perhaps more significant discoveries could have been made which may be impossible in our smaller sized schools now.

MURPHY: I feel that Don Reck's point of talking to engineering students underlies the problem of scientists and theologians talking together. How do they find God in what they're studying? We also have Elena Collicelli's point about the difficulty of talking to the English people or of getting them to talk about science. I think the route to the English people is to talk about creativity and the creative imagination. The same would be true with engineers if you would talk about discovery and innovation. Talk to them about something they're concerned about.

Let me suggest some resources that I feel can do it. I feel that with the English people one of the key things might be Michael Polanyi's article. It's a gem of an essay on creative imagination, because he focuses in part of it on how to talk to English people and vice versa. And you can use it with them because they can follow along. It's a real discovery for them to find out that the creative process is essentially the same and the discovery process is essentially a creative process. A second thing that's very helpful is a 20 minute film about why people create. It is a Saul Bass film which won several awards. It has Einstein, Hemingway and Bonner talking about how they came on their discoveries. It's all simple. The idea was simple and they didn't realize quite what it meant and so forth. Engineers could have a closer look at biographical sketches about how some of the major innovations, things of this century say, came about. They could consider, for example, Carlson and the copying process and even something as simple as, say, the coaster brake. Those are two routes to get at what is probably common ground. In other words, what is the creative process for everyone?

ACKER: I was an English major before I was a nun. After Sputnik I was sent to major in science. I have degrees in chemistry and in English. I keep telling the seminarians that science is one of the humanities. We talk about the humanities and science as if they were dichotomies. From past history, I have discovered that science has always been considered to be one of the humanities. When did it stop being one of the humanities? It's true we're not talking the same language. As an English major, I thought a log was something you burned in a fire. In the Master's program in chemistry at Notre Dame I learned what a log was in science. A field is something you plant, but to physicists fields are something else. We must do what Dr. Langdon Gilkey said, when he spoke at Hiram College this year. We have to start talking to one another.

If there is going to be a future conference, it should have a narrow focus. I don't think we can go from kindergarten on up. I have been a high school teacher for 30 years and I think it's the high school that feeds our colleges. We have to start talking to the high school teachers of all the disciplines. I think we can approach the high school teachers from the point of view of creativity if they're English teachers. Moreover, science teaches the scientific method but it's all wrong. The scientific method isn't what's in our books at all. We must re-teach scientists what the scientific method is all about. The scientific method is very subjective and very creative. It's not so objective as we'd like to think.

As Sr. Leona said, ITEST could get a Chautauqua Institute. The people from Dayton know what I'm talking about because Jordan Minor at Dayton is in charge of these three day institutes given to college teachers all over the country. I've taken three of them and they've opened my eyes. We could have such an institute to consider God and science. We would get people from all disciplines in college. Why don't we get involved in a Chautauqua Institute focusing on the high school teachers. That's the way we're going to come upon God in His laboratories of creation, in many different ways. When I was an English teacher, I came upon God in poetry. So too, when I got into astronomy and into geology. I just finished a ten day river-running trip in the Grand Canyon. But God in creation there was wonderful too. We can come upon Him from all disciplines. And that's what I think ITEST ought to do.

MCGUIRE: I want to come back to the question of the core curriculum. It seems that a number of colleges, many of the colleges represented here, are engaging in a re-examination of the core. I'm wondering why. What is the driving force? Is it a question of the dominance of the humanities? Do the departments feel they need more space in the curriculum for their own majors programs? Perhaps they're looking at a reduction of core in those institutions where we have so much of our program in core. Is it a question of reshuffling when courses are taken rather than looking at the basic content of the core? Are we looking at it from the viewpoint of the student? What is the best education that this institution can give to this student in the tradition of our institution, without, perhaps, worrying too much about the turf we are protecting?

It's very difficult to change the core, because we've already locked ourselves in so much to the faculty that we already have and in the requirements that we already have. Even to shift the time when a core course is taken -- whether it's taken in the freshman year or the sophomore year, for example -- becomes extremely difficult. Take, for example, a science course for non-science students. We often tend to put that in the freshman year or, perhaps, the sophomore year. The opinion is that we need time for students to sort out what their major is going to be. Therefore, we'll let them take these general ed requirements early. But, in fact, at the developmental viewpoint of the student, that might be the worst time for the student to take the course. The student is not prepared to be able to handle the concepts of the kind you give him.

Another point! I come from chemistry, but I wonder whether or not we in the chemistry department would be willing to have a departmental policy that we incorporate in our chemistry courses, the question of values. We do that as an individual teacher in our course, but I don't know that departments would be willing to establish this kind of policy. Secondly, is the faculty prepared to do this, since many faculty now come from a program which has not gone into these particular questions themselves? I think these questions related to the core are extremely important in terms of the kind of education we're going to provide for our students. Coming from the kinds of colleges that many of us do, we seem to indicate that we are trying to educate "the whole person." But I wonder if, in terms of our core, we as the faculty are going to make the commitment and the sacrifice to give up some courses so that we can better educate our students.

MAGILL: I would like to develop comments by the three previous speakers, and add a few remarks. The core question is important in terms of focusing our attention on a future conference. But there may be a more fundamental underlying question. First, I want some clarification.

There may be an understanding, certainly among elements of the scientists, too readily associating theology as being almost synonymous with a church-related institution. It seems to me that the problems that science has in a church-related institution are about the same that theology has in terms of research and in teaching. Questions that science has in terms of identity or in terms of tradition, understanding and promoting that tradition, seem to me the very problems that theology is also struggling with. That's my first clarification, that science and theology have the same problem in a church-related institution.

Second, I gather from many of the comments not only in the papers but also in the discussion, the words paradigm, model and creative imagination are being used rather frequently; and it seems to be forming a sort of common language. It's a concern that many of us are raising. We're trying to voice the specific problem in terms of a paradigm. It should be no surprise to us in science or theology that our problems at the moment are seriously examined in various paradigms. I'm suggesting, particularly in terms of the comments made by Sr. Joan, that, as a focus for a future conference, we may want to allude particularly to paradigms as a way of doing science and of doing theology in a church-related institution. I see the question of paradigms underlying the core question.

Having said this, I would first make a specific proposal. If we have a future conference, I would suggest paradigms of theology for science in a church-related institution and paradigms of science for theology in a church-related institution as a focus. If that is worthwhile, it would probably be better to do it with the focus of specialty,

remaining at a level that might be too difficult for high school teachers to deal with. ITEST might be able to make a substantial contribution to the academy in this country by promoting some paradigms as clearly delineated. This goes between theology and science in a church-related institution.

BERTRAM: Many themes have been touched upon, but I'm going to isolate two of them. One was Charles Ford's (NY) reminder that we are trying between now and adjournment time tomorrow to come to some terms with a proposal for a future conference. Under that general heading, I discerned at least three subheads.

Who should be included? Ought the participants be only the people from the sciences or ought they include our sisters and brothers from the arts and the humanities? Some thought they ought to be included. Next, how could we get them there? A second subhead under that general theme was how inclusive the personnel ought to be in terms of levels of education. Should it be K through university, or should it be more restricted? Then in the more recent remarks, there was some consideration of the substance of such a conference. What ought the themes to be, et cetera?

The second larger theme that wove in and out of the discussion -- and this is very tricky, at least for me; you're at the mercy of a theologian -- but I'd like to weave it into a kind of chain of reasoning which none of you was reckless enough to venture. It goes something like this. Step one: science is a way to know God. There were many variations on that theme. Another theme is that many people resist, yea fear, science. I'm not using any stronger language than the speakers did. Now comes an intrusion of my own. These people must sense that there is something about science that is fearsome. Whatever else it is, it may be that science knows God. The next step, also my own, is that so many people cannot be wrong. There is something fearsome about knowing God. None of you conceded that. My job is partly that of a provocateur. That brings us to a dilemma which I think many of you might share, and that is if there is something fearsome or dangerous, as Charles Ford (St. Louis) said, about knowing God, there is something at least as dangerous and fearsome about not knowing God. It's, I suppose, the dilemma between Perrine and Brungs, the dilemma between dirty dishes and bad smells on the one hand and kisses on the other. Being a husband and a father, my recollection is that every place I've ever gotten kisses is the same location where there have been bad smells and dirty dishes. Seriously, if that is a dilemma, then one of the acknowledged or unacknowledged frightening things about science is that it might just lead to the knowing of God. The other pole of the dilemma is that it is at least as dangerous not to know God. Put crudely, you are damned if you do science, you are damned if you do not.

That, then, creates a job for theologians, but not just for them, for all reflective Christians. The proposer ought to find a way to that dilemma. Here I would come back to what my colleague Robert Brungs reminded us about when he said he assumes that church-related colleges are indeed related to the church. He developed that and said that by church, he means the church of Jesus Christ in which this God is incarnate. One of the challenges remaining for us is to see if my statement of the dilemma has value to it and if Fr. Brungs' proposal meets that challenge of that dilemma. I could see a much easier way than using the Christian Gospel as a solution to the dilemma. An easier way would be to dismiss the dilemma and say that in no sense is the knowing of God dangerous.

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