



Science/Technology Education in Church-Related Colleges and Universities

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Reflection: Imaginative Learning in Theology, Science and Technology

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Reflection: Imaginative Learning in Theology, Science and Technology

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We reach the high ground of wisdom, especially in matters of the academy, all too often with hindsight. After struggling with a morass of data we find ourselves hesitatingly promoting an argument, hitherto unnoticed. A review paper on conference presentations and discussions provides the security of such a vantage point. Despite the attractiveness of such an approach, this paper attempts a more precarious route.

In light of the dynamic interaction during this ITEST conference, it seems more suitable to preface the published papers with an interdisciplinary reflection on the selected topic, *Science/technology Education in Church-Related Colleges and Universities*. A systematic examination of some key issues in the papers and dialogue can be a helpful lens to focus the plurality of opinions that characterizes a successful, scholarly meeting. These initial remarks attempt to capture and examine the central concern of the participants about modes of learning in Theology, Science, and Technology. Here, the introduction of Theology reflects the widespread interest in a faith community as characteristic of a Church-Related College. In each of these disciplines two fundamental questions arise: how do we interpret data as a learning process, and what significance do the similarities of interpretation have for a liberal arts education? Underlying both questions is the complex relation between Nature and Grace, and so, with this we begin our reflection.

Nature And Grace

Science and Technology seek to investigate and harness the complex reality of nature. The ensuing dilemmas of when to control nature by rational dominion and when to celebrate it by supporting its fragility and enhancing its environmental evolution inevitably introduces the scientist into the realm of ethics. Theology seeks to understand and explain the mystery of God relating to human nature as creator and redeemer whose grace transforms our human potential for spiritual flourishing. This includes the ethical dimension of responsible action within the empirical possibilities for developing nature. Therefore, the scientist and theologian alike must address the reality of nature from an empirical and ethical perspective. Yet the borderline between the material and spiritual world is not so clearly delineated in a technological age that faces the urgent distinction between what can be done and what should be done.

In the Christian tradition there is no single understanding of how God's grace relates to nature. In particular, the explanation of the Fall, Original Sin, and God's Salvific Grace has significantly divided the Roman Catholic and Reform traditions. Without entering the complexity of these debates, some common ground in theological anthropology (the meaning of the divinity-humanity relation) cautions the theologian against naive interpretations of nature. God cannot be easily perceived in nature. For example, even the most benign explanation of the optimistic Catholic view that nature was not basically disturbed by the Fall bids us beware. Such a view explains that nature and Grace are harmoniously related in a way that enables God to transform nature without changing it, akin to the proverbial cognac lacing the gâteau. Even here, the glory and majesty of God cannot be directly discerned. If,

for example, we claim that in the beauty of molecular structure we recognize the face of God, what sort of God is portrayed in the AIDS virus? Even in the finest natural beauty, the mysterious presence of God appears only vaguely, confusedly, and at most, analogously. All the more does humanity's holiness arise only through God's forgiving mercy.

The process of secularization has emancipated reason from any religious connection. This triumph of reason has generated a sort of control over nature that appears as the hallmark of modern technical science without any religious connection whatsoever. In such a context, the domination of nature by emancipated reason can become an end in itself.

Yet, God's supernatural grace urges us, through the flourishing of nature and humanity, to participate in the divine creative purposes. To do this, Theology investigates and explains the religious significance of scientific progress, especially in the ethical dimension of the proper use of nature (e. g., the impact of industry on the environment), and in resisting the propensity for depersonalization by technological development (e. g., causing financial havoc for society through computer controlled investment planning). Not every scientific advance is humanly liberating. The inevitable trade-offs between costs and benefits must be resolved within an ethical perspective that relates nature to God's supernatural purposes. In a religious context, the pursuit of science is the means to both human and divine purposes. There are two crucial aspects in this theological process of interpreting empirical reality; first, the relation between salvation and stewardship, second, the relation between faith and reason.

Salvation and Stewardship

To seek God in all things entails our stewardship of creation. If Salvation has opened the possibility of yearning for God by enabling nature to flourish, we stand responsible before God; the greater our scientific technology, the more demanding our responsibility. This encourages us to reverse the secularizing tendencies in society today by identifying our religious belief as both legitimate and meaningful for scientific and technological growth. The integration of the truths of Revelation and Religious Tradition with the truths of Science and Technology is the demanding contemporary task of Theology.

As religious thought seriously engages new scientific insights, scientists may also engage the human and religious realities in the context of responding to the divine call. The call of Christ encompasses not only personal relationships but, also the relationship between scholar and science. The total nature of this call demands unqualified response of the whole self to the entire domain of reality, religious and scientific. And, as science and religion are destined to blindness without such a response to the divine calling, so too will human freedom flourish in the quest to recover the original relation with God.

Faith And Reason

How we discern the balance between dominion and acquiescence, between active control and passive acceptance of the manifold opportunities in nature, will remain the function of reason in the context of faith. The insights of Teilhard de Chardin center upon this integration of Religion and Science as the one act of knowledge. While we approach these as separate specialties we ought not lose sight of their underlying cohesion. Speaking of God is strewn with the difficulties of mystery. But less so with Science, and in particular with its ethical dilemmas; we hope that the unknown is within our rational grasp, though this may be a false hope as we stand before the transcendent mystery of God.

When faith and reason are united there can rise a harmony of meaning that yields the capability for mutual enlightenment and for enriching the autonomy of each. This interpretation is possible because Theology and Science advance their learning in remarkably similar ways. At least at the foundational level, both seek truth not so much by proof but by persuasive argument. This occurs not so much by the classical scientific paradigm of deductive reasoning but by the more inductive interpreting of the available data and tentative suggesting of

hypotheses to understand what we see, and thereby to reach forward to new knowledge, predicting and testing as we progress. If this is an acceptable comparison, the interpretation of data can be the linchpin in relating Theology, Science, and Technology in Church related colleges.

The Interpretation Of Data

Christian Religion cannot be reduced to hand-down phenomena that is exhaustively tied to the Revelation of Scripture and the authority of past Tradition. Rather, the dynamic development of Religion requires Theology to reflect upon the past in the present by anticipating the future. Simply, this is a task of interpretation that employs sound reasoning within the context of faith. This interpretative function also appears to characterize empirical research in Science, although the significance of a faith horizon requires careful explanation. To undertake such an interpretation, which includes an examination of historical experience in Theology and of empirical reality in Science, raises the important question of different methods and models of knowledge.

Method And Models

Language influences our understanding of reality, whether spiritual or natural, and manifests an inseparability of the knowing subject and object known. When we interpret data there is always a personal dimension to our knowledge that reflects our education and culture and thus influences our perception. This personal element of knowledge is less noticeable in the deductive method of reasoning, yet it is required for the selection of discursive premises and the determining the direction of deduction. Yet, the more obvious advance of knowledge does not occur in this abstract fashion because reality cannot be reduced to a set of postulates. Rather, most research progress occurs by accumulating and interpreting data by a method of reasoning that transcends the systematic limitations of deduction and includes a distinctly personal element in perception. There is in deduction a similar openness (Gödel's incompleteness argument) to that in induction (Popper's falsification argument).

This personal method of reasoning is most apparent in the adoption of schemata or models by Science and Technology. Models help explain the insights that arise from experimentally verified data, by carefully organizing all the details and coherently formulating their meaning. Though these models bear a distinctly subjective element they are indispensable for advancing our learning. No aspect of education or scholarship is neutral in the sense of being without personal influence. Models, each implying some subjective view, enable us to retrieve and develop past knowledge in light of new data, and thereby anticipate the future by predicting results and seeking ever-new discoveries. The success of a given model lies in its capability of tentatively explaining and predicting the complex reality of natural phenomena.

Theology also adopts this evolving process of discovery in its development of religious doctrine. In this sense scientific empiricism and religious doctrine are remarkably similar. As Science uses models to give meaning to the accumulation of empirical data, Theology uses models to understand our ever changing historical experience as a window onto the divine, thereby enabling us to further explain the mysterious reality of divine-human interaction. Theology retrieves the doctrines of the past to invigorate and develop them in light of reality today in order to reach into the future by anticipating what we can be and do ethically and morally. The historical and transcendental features of contemporary theology focus on these issues where truth and value embrace the whole range of human development. Discovery and development lure us forward in both Theology and Science as the unfolding of the creative and salvific acts of God allowing nature to flourish. This occurs in our labors in which we create things and values in accord with the divine mandates that are manifest in God's action in creation. And these labors bring both the glorification and service of God. It is the fulfillment of these divine purposes that enables us to participate in these creative acts as we seek to regain a lost union.

Certainly, Theology and Science deal with different object-materials because they are divergent specialties and therefore use some very different models. But they both adopt a remarkably similar learning procedure: they select methods of reasoning that employ models to explain and predict the complexity of reality. And in this process the question of interpretation (hermeneutics) is central to these disciplines.

Interpretation And Imagination

The interpretation of data is possible only within a larger horizon. Even the selection of specific models reflects this broader vision. A holistic perspective promotes our understanding of the relevant data in every academic field. Central to this synthetic overview, whether as the foundational context for all knowledge, or as a particular horizon for understanding specific data, is the assimilation of past truths and future possibilities with present reality and insight. For example, when we decide to marry our future spouse, the discernment, or insight, arises only by integrating our past experiences with hopes for what lies ahead in relation to present reality; and the married couple enter into God's creative and salvific process, thereby giving glory and service to God. Both Science and Theology employ hypotheses to understand reality and also participate in the creative and salvific purposes of God. From the accumulation of relevant data we construct hypotheses, and the process of verification entails finding data that fits these hypotheses to advance knowledge step by step. The recognition of truth occurs when we perceive the data fitting together, converging upon a conclusion which may take a long time to discursively unpack by logical discourse alone. This procedure of interpretation requires an appeal to the imagination.

The imagination has three features in this process of interpretation. First, it enables us to synthetically grasp the data at hand. Second, it recognizes when the data converges upon a conclusion even though it remains logically short of it (as hypothesis). Third, it gives meaning to the conclusion in relation to the interpretative horizon of objective data and subjective understanding, and thereby avoids the danger of randomness or whim; and subsequent verification of the conclusion requires an ongoing quest for data to fit the hypothesis. This applies as much in Theology as it does in Science and suggests a horizon of mutual interaction that will advance our understanding of nature within a religious context and thereby develop our awareness of the mysterious presence of God. How these insights are formulated by language in scientific principles or religious doctrines is a complex matter. Suffice it to say for the present comparison of method and interpretation that both are open to subsequent insights and the development of doctrinal and scientific formulations.

Imaginative learning in Theology, Science and Technology is the corollary of the interpretative similarities in these subjects. If this is so then an appeal to the imagination becomes a central function of education, especially in church-related schools and therefore should be a characteristic feature of Liberal Arts education.

Liberal Arts Education.

This emphasis upon imagination is important because church-related schools explicitly acknowledge a religious context for their academic commitment. On the one hand, this religious context provides an interpretative horizon for Science and Technology in faith communities. On the other hand, imagination enables Science and Technology to explain reality in more historically relevant models and thereby both reinforce and challenge religious and scientific doctrine and belief. This imaginative interaction not only highlights the independence and integration of the disciplines, but also in Liberal Arts education sharply focuses the important distinction between the possible and the ethical.

Independence and Integration.

Certainly Science and Theology must retain their independence because each has specifically different object-materials and resources to study. As Science advances our understanding of nature by investigating empirical reality in relation to the inherited insights of past research, Theology examines experience in relation to the communal wisdom of past tradition of understanding God's action in history in order to develop our explanation of the relation between divinity and humanity. The autonomy of each specialty warrants its own rules and restraints, and ought not to be burdened by restrictions that may be legitimate within other specialties. However, we have also suggested that their underlying methods, models, and interpretations can be remarkably similar. Therefore, the legitimate integration of these disciplines can be coherently proposed, especially by appeal to the imagination. This integration resists confrontation between the disciplines and can be described both from the perspective of Theology and that of Science.

First, from the perspective of science, the faith community of a church-related school legitimizes Theology as an interpretative horizon for Science and Technology. If the verification of hypotheses in scientific research receives meaning from the model adopted, an interpretative process is needed both in the selection of the model and in the perception of the hypothesis from converging data. In this process the horizon of religious belief has an influence, not in determining the outcome of the hypothesis and data, but in discerning the broader *significance* of each scientific insight. Not only does belief give impetus and stimulus to further research in fulfilling God's creative and redemptive purposes, but much more importantly, it enhances the sense of ultimacy and mystery of the transcendent God in every scientific discovery. The meaning of technological advance varies according to the horizon of interpretation. A faith environment not only brings a religious motivation but broadens the meaning of scientific results. To glimpse, albeit dimly, God's presence through the flourishing of human nature is no small human accomplishment, even though, as mentioned earlier, caution must constrain overly optimistic claims for perceiving transcendent mystery.

Second, from the theological perspective, the integration of these disciplines in the Liberal Arts education of church related schools enables Science and Technology to challenge religious belief and doctrine. If imaginative interpretation legitimizes giving a religious significance to a scientific discovery, in turn it also warrants the contribution of scientific discovery to the development of religious belief and doctrine. To maintain a reciprocity between the analogical narratives of language about God and ongoing human flourishing, theology must integrate the ever-changing portraits of nature depicted by scientific research. The holistic character of this creative interchange will ensure that Science will maintain a harmony between its broad view of nature and its many research specializations that progress demands. For the imagination not only provides models of interpretation within the specific specializations of each discipline but also enables each to reach above its detailed research with a panoramic view of its materials and discoveries. At this generic level we require a cultivation of the imagination to facilitate the integration of Science and Technology with Theology in reciprocal influence, yet with each retaining autonomy.

Within such an integrative framework between technological literacy and religious commitment, Liberal Arts education will not only continually evolve its curriculum by encouraging creative teaching and innovative research, but will also reach out to its local community. This integration enables students to appreciate the factors at work in today's complex world. If specialist training is fundamental for clear thinking, interdisciplinary study is as important for imaginative thinking, not just between academic specialties but also within the community, between different levels of education, and different segments of society, to provide a full panoply of imaginative learning experiences within cultural diversity. To maintain a balanced curriculum in a world where scientific sophistication and religious education compete for diversity and autonomy, requires a sensitivity to the difference between what is possible and what is ethical. This paper suggests that developing the distinction between what is scientifically feasible, what seems socially desirable, and what is religiously justifiable is most possible when there's a dynamic integration of Theology, Science and Technology.

The Possible and the Ethical.

The question of moral imperatives is foundational to the imaginative balance between scholarly diversity and personal integrity in a Liberal Arts education. If the dynamism of education demands we be attentive, intelligent, reasonable, and responsible, it is the imagination enabling us to reach a deeper self-awareness that imbues empirical knowledge with ethical considerations. The synthetic and creative functions of the imagination enable us to obtain a holistic view of self and transcend the present reality to what is possible. In a society faced with scientific and technological dilemmas (gene control, brain surgery, etc.), a church-related school can relate the empirical and ethical within the interpretative horizon of religious ultimacy. The vision of a faith community that takes scientific study seriously can provide a celebration of the divine and human where their intermingling cultivates an awareness of transcendent mystery as significant for ethical deliberation. The need for the formation of Christians to sensitize the scientific community, which remains predominantly pre-Christian, becomes more urgent every year.

Theology contributes to the critique of Science and Technology by discerning the borderline between what science can do and what ethics permits. The coherence between these disciplines will become more complex as progress leads society onward, and the temptation to allow each to go its separate way will increase. Without a Liberal Arts education Science and Technology are impoverished by the lack of the interpretative horizon of at least Philosophy and more ideally Theology. Thus, a central function of Liberal Arts education will be to maintain dialogue between Theology and Science and to avoid a dichotomy arising between orthodoxy and orthopraxis. Church-related schools' mission statements will contribute substantially to this collegial undertaking of developing critically informed moral judgments and ensuring that Science and Technology remain alert to ethical considerations. These statements can't diminish the primary responsibility of each discipline to continue collaborative research in their comparative methodologies, and to promote the reciprocal integration of each discipline's insights in teaching, research and publications. This paper suggests that Liberal Arts education in church-related schools has a dynamic future in developing an imaginative interaction between Theology, Science, Philosophy and Technology. The following papers and discussions provide suggestions for implementing the appeal for the collaborative integration of Science and Technology Education in Church-Related Colleges and Universities.

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