The Association of Theological Schools
The Commission on Accrediting

Engaging Science in Seminaries: Report of Interview Findings

Submitted to:

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SECTION I: OVERVIEW

Project Background

Engaging Science in Seminaries/Templeton Project

The John Templeton Foundation funded a two-year study to establish a baseline understanding of teaching about science and its implications for theological thought and action within Protestant schools in the United States and Canada. It was presumed that the 214 Protestant schools, members of the Association of Theological Schools (ATS), would have varying levels of understanding of and interaction with science. Yet, little is known about the particular approaches the schools take to integrate science and theology in their curricula or the institutional perspectives about the field.

Through the generous funding of John Templeton Foundation, ATS Research launched the Engaging Science in Seminaries (ESS) research study in hopes to establish a baseline of science engagement in its Protestant member schools. The study included three phases: (1) a survey of science engagement among ATS faculty at Protestant schools, (2) in-depth interviews with key informants at 30 representative Protestant seminaries, and (3) analysis of documents that show evidence of institutional engagement of science at the same 30 schools. While the first phase captured individual faculty perspectives, the latter two phases provided opportunity to ascertain the climate of science engagement on campus, the quality of existing science engagement, and various challenges and opportunities for adding science to the many elements of the seminary's overall program.

ATS ESS Project - Interview Phase

In June, 2016, ATS Director of Research and Faculty Development commissioned two research consultants to complete an assessment of ATS Protestant schools' engagement with science by interviewing key informants at 30 representative Protestant seminaries. Research consultants worked collaboratively with ATS, as well as one another, to create an interview instrument. After consent was obtained from key informants by the ATS Director of Research and Faculty Development, each consultant was assigned 15 interviewees to establish interview scheduling and complete in-depth one-to-one interviews between October and December, 2016. This report details the results of the ESS interview phase.

Interview Protocol

The study targeted a purposeful sample of institutional leaders at 30 different participating ATS institutions within the United States and Canada. Utilizing open-ended query, questions were framed around three topics which were illuminated as significant from the faculty survey phase of the ESS research project and/or were important to ATS. Those three topics included: (1) clergy preparation and culture, (2) science relevance and incorporation on seminary campuses, and (3) science resources. The study sought to gather data through the perceptions, knowledge, and experiences of key campus informants and analyze how seminaries engage science. The protocol's specific aims were to:

i. Assess current climate/perception of science engagement on campus,
ii. Assess the quality of existing science engagement on campus,
iii. Identify opportunities (advantages/strengths) for adding (broadening) science to elements of the seminary's overall program, and

iv. Identify barriers/challenges that may impede adding science to elements of the seminary's overall program.

Section II contains a description of the study's analytical framework and methodology, including processes and protocol for sample selection and collecting, analyzing and storing data.

Section III provides an analysis of research findings, key themes, identified separately by the two research consultants, and limitations of the study, while

Section IV offers a preliminary set of conclusions regarding engaging science in seminaries for the Association of Theological Schools, including synthesis of findings, implications, and suggested next steps.

SECTION II: THE QUALITATIVE STUDY (SAMPLE & METHODOLOGY)

Objectives

The protocol targeted a purposeful sample of institutional leaders (administrators and faculty) at 30 different ATS member institutions within the United States and Canada. Ultimately, 29 participated in 40-to-75-minute, individually audio-recorded interviews conducted online. Designed and carried out by a 2-person research team trained in qualitative research methods and scientific, as well as theological, programs, the study sought to:

i. Assess current climate/perception of science engagement on campus,
ii. Assess the quality of existing science engagement on campus,
iii. Identify opportunities (advantages/strengths) for adding (broadening) science to elements of the seminary's overall program,
iv. Identify barriers/challenges that may impede adding science to elements of the seminary's overall program.

Sampling

Selection of schools for the sample was based on two criteria and followed a tiered, stratified sampling approach. The tiers included: 1) 7 of the 10 schools that participated in the first grant cycle of the Science for Seminaries project, co-sponsored by the American Association for the Advancement of Science and the Association of Theological Schools, and 2) a representation of Protestant ATS schools across a number of institutional variables that are considered salient in ATS research (e.g., institution's ecclesial family, structure, size, Carnegie research categorization, Historically Black Theological School status).

Interview Protocol Instrument

The ATS Director of Research and Faculty Development, Debbie Gin, Drew Rick-Miller from the Templeton Foundation, and both research consultants (Sybrina Atwaters and Jeney Park-Hearn) collaboratively developed the interview protocol. In review of ESS survey findings and key themes, as well as questions/concerns of stakeholders presented to the research consultants, an instrument was constructed.

The instrument consisted of 14 guiding interview questions, with occasional follow-up inquiries for clarification, formulated around three topic areas: (1) clergy preparation and culture, (2) science relevance and incorporation on seminary campuses, and (3) science resources.

The interview questions were situated within six areas for coherency:

1. Current Issues
2. Relevancy/Irrelevancy
3. Classroom Experiences
4. Curriculum
5. Access
6. Attitude.

Open-ended questions were used to capture qualitative data for micro-level analysis of respondents' perceptions and institutional knowledge regarding how science was engaged in classrooms and across campuses, as well as institutional attitudes regarding science engagement. After careful review and conference calls between ATS

project team and research consultants, a final set of interview questions was devised (see Appendix B for protocol).

Methodology and Administration of Interviews

The recruitment of schools and study participants was undertaken by ATS Director of Research and Faculty Development. Priority was given to schools where a document collector could be hired during the same timeframe. (See report on document collection and analysis phase of the project.) After a 3-week recruitment phase, ATS nominated 30 interviewees and sent informed consent forms electronically to each interviewee. Research consultants scheduled assigned interviewees to online in-depth interviews. Fourteen interviews were scheduled by one research consultant and fifteen by the second research consultant.

Interviews were conducted over a two-month period, separately, by each research consultant. At the beginning of each interview, researchers provided a brief summary of the research study and obtained verbal consent from interviewees to record the interview. Interviews were recorded using a secure ATS account through Level-3 Conferencing services.

Interview Pool and Respondents

In the final sample, a total of 29 key informants, from 29 ATS Protestant schools, were interviewed. There were 5 (17%) female subjects and 24 (83%) male subjects. The interview pool included variance in institutional structure (defined as embedded in a larger university, church, or other setting, or freestanding, as in a stand-alone institution) and size (small, 1-75; mid-sized, 76-150; large 151-300; largest 300+). Freestanding seminaries represented 52% of respondents, which is an underrepresentation of the 65% freestanding schools among Protestant schools in the ATS database. The interview pool consisted of schools affiliated with evangelical (55%) and mainline (45%) ecclesial families, which aligns closely with the 58% evangelical and 42% mainline schools in the ATS database. The denominational families represented included: Interdenominational/Multidenominational (24%), Methodist (14%), Presbyterian (14%), Baptist (10%), Pentecostal (7%), Nondenominational (7%), and 1 Anglican, Lutheran, Reform, Adventist, and United Church of Christ institution. The interview pool also included ATS institutional representation that span different institution size: small (7%), mid (17%), large (31%) and largest (45%). For comparison, 20% of Protestant schools in the ATS database are small, 27% are mid-sized, 28% are large, and 25% are largest. Tables 1.1 and ~~1.2~~ [REDACTED FOR PURPOSES OF WEBSITE PUBLICATION] below provide a snapshot of the ATS ESS interview pool.

Data Collection and Analysis

A total of 1,682 combined interview minutes were collected. Interviews were transcribed using an external transcription service. Transcripts were returned to research consultants and uploaded to Dedoose for coding and analysis. To maintain confidentiality, interview data were coded and stored under pseudonyms. Names and any other identifying information were removed from transcripts and are not included in this report. Raw audio files are stored on a secure server and have been shared according to the national ethics guidelines for digital integrity as recommended by the National Academies.[1]

[1] See National Academies, (2009), Ensuring the Integrity, Accessibility, and Stewardship of Research Data in the Digital Age. Retrieved from http://www.nap.edu/catalog/12615/ensuring-the-integrity-accessibility-and-stewardship-of-research-data-in-the-digital-age.

Table 1.1: ATS ESS Interview Pool by Institutional Characteristic

Researcher	Name (Pseudonym)	Gender	Ecclesial Family	Structure	Size (HC)	Denomination	Country
sybrina94	Brian White	M	Mainline	Freestanding	Large	Presbyterian	US
sybrina94	Debra Jones	F	Mainline	Freestanding	Small	Baptist	US
sybrina94	Gina Davidson	F	Evangelical	Freestanding	Largest	Pentecostal	US
sybrina94	Harper Morris	M	Evangelical	Embedded	Largest	Adventist Bodies	US
sybrina94	Harry Little	M	Mainline	Freestanding	Mid	Lutheran	US
sybrina94	Henrietta Adams	F	Mainline	Embedded	Mid	Presbyterian	US
sybrina94	Henry Smith	M	Evangelical	Freestanding	Largest	Reformed	US
sybrina94	Jacinta Jenkins	F	Evangelical	Freestanding	Large	Pentecostal	US
sybrina94	Lee Jefferson	M	Evangelical	Embedded	Largest	Interdenominational/Multidenominational	US
sybrina94	Mark David	M	Mainline	Embedded	Small	Anglican	Canada
sybrina94	Oscar Jeffries	M	Evangelical	Freestanding	Largest	Lutheran	US
sybrina94	Phillip Johnson	M	Evangelical	Embedded	Large	Evangelical Covenant Church	US
sybrina94	Sam Richards	M	Evangelical	Embedded	Mid	Methodist	US
sybrina94	William Knight	M	Mainline	Freestanding	Large	Methodist	US
rparkhearn	Brad Jacobson	M	Evangelical	Freestanding	Largest	Interdenominational/Multidenominational	US
rparkhearn	Carl Reese	M	Mainline	Freestanding	Large	Presbyterian	US
rparkhearn	Christine Abbott	F	Mainline	Freestanding	Large	Presbyterian	US
rparkhearn	Doug Smith	M	Evangelical	Embedded	Largest	Interdenominational/Multidenominational	US
rparkhearn	Henry Miller	M	Mainline	Freestanding	Large	United Church of Christ	US
rparkhearn	Henry Richards	M	Evangelical	Freestanding	Largest	Interdenominational/Multidenominational	Canada
rparkhearn	Jason Kepler	M	Mainline	Embedded	Mid	Interdenominational/Multidenominational	US
rparkhearn	Mark Reynolds	M	Mainline	Embedded	Largest	Methodist	US
rparkhearn	Michael Preston	M	Evangelical	Embedded	Large	Nondenominational	US
rparkhearn	Nick Ashton	M	Evangelical	Embedded	Largest	Interdenominational/Multidenominational	Canada
rparkhearn	Patrick Milton	M	Evangelical	Freestanding	Largest	Interdenominational/Multidenominational	US
rparkhearn	Ronald King	M	Evangelical	Embedded	Largest	Baptist	US
rparkhearn	Stuart Sand	M	Evangelical	Freestanding	Large	Baptist	Canada
rparkhearn	Walter Fines	M	Mainline	Embedded	Mid	Nondenominational	US
rparkhearn	William West	M	Mainline	Embedded	Largest	Methodist	US

[TABLE 1.2 REDACTED FOR PURPOSES OF WEBSITE PUBLICATION]

Using Dedoose software, transcript data were coded and patterns identified. Using Straus and Corbin (1994) grounded theory *coding* method, the research consultants developed a system to categorize and thematize interview data collected.

The coding categories were largely formed by the topics of focus in the interview questions—(1) clergy preparation and culture, (2) science relevance and incorporation on seminary campuses, and (3) science resources—and each coding category was further coded with subcategories for more fine-tuned data related to the broader topic. For instance, coding for the science on campus category was related to the subcategories science

areas, student response, gatekeepers, science courses, and sources.[2] Additional coding methods were used to identify similarity[3] across the various schools, by various institutional characteristic and particularly by ecclesial family line.[4]

[2] The subcategories for clergy and culture included current issues, relevance and ranking and the subcategories for resources included attitude, access, and broadening engagement.

[3] Joseph A. Maxwell and Margaret Chmiel discuss qualitative data analysis strategies and identify similarity and contiguity as two frameworks for understanding the relationship between ideas. Analysis that is based upon similarities observes and examines shared features or congruence between ideas that are not necessarily bound by the particularities of time and place. In other words, this strategy is fitting for comparisons that involve different schools that are independent of one another. Joseph A. Maxwell and Margaret Chmiel, "Notes Toward a Theory of Qualitative Data Analysis," in *The Sage Handbook of Qualitative Data Analysis*, ed. Uwe Flick (Los Angeles: SAGE Publications, 2014), 30.

[4] Axial coding is another level of data organization that observes external variables that give rise to the particular groupings of bodies of text. See Maxwell and Chmiel, 30.

SECTION III: KEY FINDINGS AND LIMITATIONS

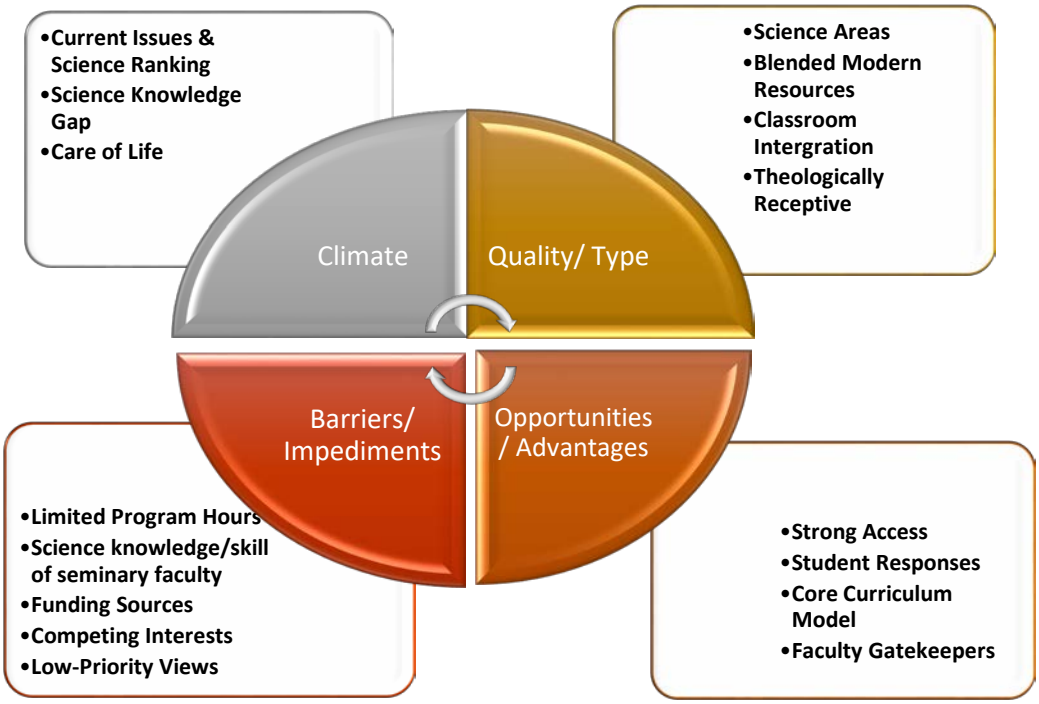
Findings from the ATS ESS Interview Phase are largely consistent with findings from the survey phase: (1) Most Protestant seminaries have faculty who engage science in the classroom (2) Engagement with social and behavioral sciences dominate in both the classroom and faculty scholarship. (3) Science engagement among faculty in Protestant seminaries is not an issue of theological tradition; there is no evangelical or mainline divide. (4) Faculty do express concern regarding student preparation to deal with science in their future ministries. (5) While faculty feel supported by their institutions to engage in science, a majority feel their institutions could be doing more to improve the school's engagement with science.

Given that the two researchers individually conducted interviews and analyzed transcripts from their assisgned group of 14 or 15 interviewees, reports of their findings are separated in this section. Excerpts of study participant voices are provided as examples of respective interview pool's perceptions and experiences.

Key Findings/Major Themes (Group 1)

In this section key findings from research group one, 14 study participants, are presented. Below is a diagram of the 4 core areas and the associated 16 themes and categories that emerged (Figure 1.3). While narratives expressed by fewer than four informants are recognized as rich descriptions of individual experiences, narratives expressed by less than 30% (4/14) of informants were not illuminated as key findings or included in this section of the report.

Figure 1.3: ATS ESS Findings Diagram—Group 1



Climate

The climate for engaging science at each seminary was assessed within a framework that took into account the ranking of subjects and the description of issues necessary for clergy preparation, as well as perceptions of science relevancy for theological education. Key findings in this area are summarized into three categories:

- Current Issues and Science Ranking
- Care of Life
- Knowledge Gaps

Current Issues and Science Ranking

Among the 14 key informants interviewed in this group, 90% of respondents expressed that science is among the top three issues that they believe are relevant to clergy preparedness and consequently to theological education in the current climate. The other two most frequently named current issues were social justice (issues of racism, sexism, and sexual identity) and self-care (both of clergy and congregational life).

The most frequently given reason for science being a significant issue for theological education can be found in the words of Sam Richard, "We live in a time when natural science, social science, engineering, and technology are among the primal shapers of our civilization."

Oscar adds, "[science and technology] are essential parts of our lives in North America. So much so that we don't even really grasp it consciously."

Phillip affirms,

> I think I have to rank [science] fairly high for a couple of reasons, in that it touches every area of our life. Who am I as a human being? What is my destiny? What does it mean for me to live? What does it mean for me to die? All of those questions are, at least in part, both theological and scientific questions.

Respondents described a modern world where science and technology has an increasing role in human life. Consequently, they view it as highly relevant to theological education.

Care for Life

Overall, respondents believed there is a welcoming and positive attitude towards science on their campus. Over 86% in this group stated that they did not believe any area of science would be off-limits on their campus. (See, also, p. 19 below, in "A Complicated Relationship between Science and Theology," for comment on the awareness that evangelical respondents in group 2 articulate about perceived animosity among donors and other constituents.) Interestingly, however, key informants provided a shared "care for life" thematic framework for how they assessed the relationship between science and seminary education. They identified various areas/disciplines of science that they considered to be most relevant or most incorporated in theological education because they attended to "care for life" issues. For instance, environmental/physics, neuroscience/other medical sciences, as well as digital technology were science disciplines most frequently identified by respondents as relevant to seminary education in the current climate.

Oscar, a key informant for a large freestanding seminary, contemplates the significance of science for human life and the care of life with these words,

> Christians have tended to react or engage particular positions like on the creation of the universe or the origins of life or, wow, more recently, unfortunately, climate change, the mind, neurosciences, genetics, and think of just the topics themselves without appreciating more generally

> how science just is so important, so determinative in most of our thinking and, well, maybe unthinking life.

Seminaries have responded to issues regarding "care of life" by increasingly implementing particular science disciplines into their program. Over 64% of interviewees in this group identified evolution and creation care (environmental science-climate change/global warming) as among the top issues of scientific concern and engagement at their seminary. Similarly, 57% found neuroscience and medical sciences as significant for seminary education since they address beginning of life, quality of life and end of life questions. Some respondents pointed out the significant role medical science plays when addressing issues of disease, memory loss, pedagogy, and formation in seminary courses.

Lastly, 36% of respondents in this group identified digital technology as a relevant scientific area because of the role of technology in shaping how people relate, communicate, learn, and function in modern society. They found technology significant in regards to human development and identity. Ironically, they indicated technology as the scientific area least addressed in theological education.

Henrietta states, "Digital technology and how this affects people's persons, their bodies, their relationships, their mental processes, that was [my] number one [ranked issue]."

William, faculty at a large Methodist seminary, agrees. He declares,

> The way that people are experiencing and understanding spirituality through science, through technology has revolutionized in the past 50—probably in the past 25 years, and that is going to continue. I think it's relevant in terms of challenging ministry. I'm realizing more and more that people are finding meaning through scientific technology communities. You can go on YouTube and people are confessing some of their deepest, darkest, or joyful moments of their lives. They would never have those conversations in any church because the church communities and congregations, they have silenced too many kinds of people or [they're] just not interested.

Although the disciplines within science that seminaries employ to address *care of life* issues varied, it was clear that these three areas (environmental, medical, and digital technology) were salient across institutional type—structure, size, and ecclesial family.

Science Knowledge Gap

Informants perceive a gap between seminary education and the role of science and technology in the lives of people. They expressed concern that a growing number of people are scientifically aware, technologically literate, as well as science and technology professionals. Yet, they feel theological education operates as if science is of marginal concern for theological formation.

Mark states,

> The biggest issue is a profound gap…in which we have a generation that is both technologically and scientifically informed, but we have a church and a theological world that has largely treated these as irrelevant, focusing on spirituality, focusing on other issues. I think that this gap is probably the biggest issue for seminaries.

Henrietta describes the gap as follows:

> I think that we have an informed laity, an informed population that is technologically and scientifically nuanced in understanding. We have a theological world that is not. This gap, I think, basically means that science is imperative. The average person sitting in a pew, whether it is a Christian or Jewish [congregation], would probably be in a medical or a technological profession.

> We have a clergyperson who would have very little understanding of what they do in their everyday life and how that life may bleed into other areas such as their faith commitments. I think it is absolutely imperative. For me it is, without a doubt, a bigger issue than declining enrollment in churches, etc. It is fundamental that our clergy and our church leadership fails to understand how invasive and important an area this is.

The knowledge gap also denotes the gaps between the ways science informs/does not inform theological understanding. Harry states,

> Though they overlap often in their areas of concern, science is not able to rule out theological claims. Science cannot give all the indicators for what good, ethical actions are. It can give us a number of facts. It is not that it is irrelevant, as it is unable to fully inform theology about what we should do in the world. That often requires religious perspectives and requires ethical positions. Science can point out that if you smoke cigarettes, you stand a one-in-six chance of developing lung cancer. That fact itself, doesn't mean you should or shouldn't smoke.

Respondents were clear that the gaps were also related to the limitations of science-theology discourse.

Quality/Type

The quality of science engaged in ATS seminaries was assessed and categorized into four types:

- Science Areas/Disciplines
- Classroom Integration
- Blended Modern Sources
- Theologically Friendly Discourse

Science Areas/Disciplines

The most common science areas engaged on seminary campuses are social and behavioral sciences. Respondents were confident that pastoral care courses employed psychology in some form. Other courses dedicated some aspect of the course to social-scientific methods or sociological theories. For example, Sam shares, "I would say, on the whole, we do a much better job of integrating social sciences—psychology, sociology, critical theory—than the natural sciences." He points out how one theoretical framework may be applied within multiple courses. Sam continues,

> Professor B in the theology department uses race theory, critical theory in his courses on—well, in all his courses, really. Including a course specifically on race, but also on his courses in Christology, and the course he teaches on art and the body.

Respondents questioned the quality of science being integrated or the quality of how science was integrated into seminary classrooms.

Mark, a former physicist, teaching at a Canadian seminary, shares,

> For the most part, most of my colleagues would think that they're doing some engagement with science by referencing one of the following: (a) either scientific evidence for something in their discipline, particularly in the Biblical studies world, maybe using climate change as evidence for why the Israelites moved into the Levant. They think that that's engagement with science. In terms of the pastoral people, they think that engagement in science is making references to the DSM-IV, the diagnostic psychological text, and using those categories to talk about people with mental illness. That would be their understanding of integration.

> For other people in the pastoral areas, it might be using soft social sciences, group theories, Maslow's Theory, these kind of things. They would all consider that to be engagement with science. What I would counter with is that, that's not engagement with science, that they actually are not explaining why the science world may have concord/discord, or may reinforce, theological concepts. It's just facts that they use, and they could be used by a Fundamentalist to talk about Noah's Ark as being real, because carbon dating reveals that the flood happened X, Y, or Z…For me the vast majority of our faculty, who would also probably say the same thing, "We are engaging with science," what I would call them is they're tourists into science, and science is merely used to prop up the theories that are already dominant in their Christian theological outlook in their disciplines.

Sam teaches at a seminary embedded within a larger university campus. He shares similar concerns but affirms that there is quality in lively science-theology conversation. Sam states,

> In our core curriculum, we have a triad of courses where we have one of the major doctoral loci paired with a major ethical theme. The first of the courses in that triad is the doctrine of God and environmental stewardship. Students talk about the doctrine of God as creator, and then they talk about creation care. Questions of environmental science would be brought to bear there. I don't know if that involves anything that an environmental scientist would regard as cutting-edge scientific inquiry, but it is an attempt to put the findings of environmental science into lively conversation with the Christian understanding of God as creator and the Christian responsibility to care for God's creation.

While social and behavioral science were the most frequently named science areas reported by the key informants interviewed, both environmental and medical sciences were also highlighted as increasingly being engaged on seminary campuses.

Interviewees shared how incorporating "natural" science into core courses produced interesting results and caused them to rethink the quality of the course, both scientifically and theologically. Gina offers insights into how neuroscience becomes an illuminating lens for the use of narratives in her homiletics course. She elaborates,

> In my homiletics class, when we talk about persuasion and narrative preaching, when people hear a story, they experience the story. When they just hear a rational logical defense, it stays pretty cognitive. But when their emotions are engaged, and if they feel the story, they're involved much more deeply, and it actually imprints the brain, so they remember things better. It's very interesting that even in homiletics, in the expository preaching classes, some of the things that we've learned about the brain and persuasion have been very significant.

Other key informants articulated how engaging science—from physics to genetics—in seminaries courses—from Old Testament to Christian Education—impacted the quality of the theological reflection as well as the scientific knowledge for course participants (faculty and students).

Classroom Integration

The most common form of science integration into seminary classroom, according to interview findings, are guest speakers. "Professors of clinical psychology, professors of medical science, and anthropologists who are not theologically trained would come in as guest lectures," summarizes Henry, a key informant from a freestanding evangelical school. Harpo, in describing an advanced science-faith elective course offered at a large embedded evangelical seminary, contends,

> We think the strongest point is the team teaching and the bringing in of scientific specialists who can actually discuss the scientific issues directly rather than us just talking about how we

> theologians think about the science. The guest lecturers who come in talk about the real challenges that come up from scientific research and how this data and this information cannot be swept under the carpet, has to be dealt with.

The second most common way that faculty integrate science in seminary classrooms is through digital resources. Over 40% of interviewees identified courses where digital resources (e.g., film, video segments, online bibliographies, webcasting, or online text) were the media by which science was integrated into seminary education at their institution.

The third most common form of classroom integration is dialogical references. Faculty will refer to a scientific concept or theory while teaching a particular topic. Participants perceived that a significant portion of science integration in the classroom was through dialogical discussion references rather than formal assessments, assigned readings, or dedication of entire course units to scientific inquiry through theological lenses.

Blended Modern Resources

Several key informants named courses, seminars, conferences, or inter-institutional projects by which science was being incorporated through blended modern sources, such as annual science and religion conferences/symposiums, non-seminary-led centers on/nearby campus, or field trips. Blended modern resources are those that involve both a science resource and a theological resource coming together to address a prescribed issue or for a prescribed event and involve some technological medium.

Henrietta describes the field trip model,

> A Christian education professor on occasion takes her students to the Center for Brain Imagery to talk about the neurological makeup of the brain and to actually have students volunteer to have their brain imaged. They discuss the development of the brain and education and how certain ways of teaching, certain pedagogies, might be more effective neurologically than others.

William highlights a recent effort by the university president to create blended resources for science engagement through innovative funding opportunities,

> Our President wrote a letter of support to [a nearby] Medical Center, maybe, a year or two ago, and their response to that, they were able to secure $500,000 to work with us and a few other communities. The idea is, through that grant and through the partnership, exploring the health sciences and diet, exercise, and things of that nature, that not only our students will be able to help transform their own individual lives, but they will also help transform their faith communities and their families, so it would be a force multiplier.

As both of these examples illustrate, the blended modern resources provide a way of engaging science in seminary education that utilizes the strength of nearby science sources/centers and invites scientific expertise into the seminary curriculum, without requiring seminary faculty to become scientifically proficient or demanding seminaries to dedicate additional physical resources to scientific equipment or endeavors.

Theologically Receptive

Study participants were asked to assess the quality of science-theology resources directly by defining good or bad resources. For 43% of respondents in this group, good resources were defined as resources that were theologically receptive. Theologically receptive resources are scientific resources by scholars with both scientific and theological backgrounds or resources that explore issues scientifically as well as theologically without anti-discipline jargon.

William claims, "Too often, science and religion, are not as inclusive as they could be. I think what we consider good resources are the ones that acknowledge or have appreciation of religion and faith." Lee asserts, "Bad resources are the ones where competent scientists…don't look at religion favorably." Jacinta adds,

> Bad material is material written strictly from a narrow theological interpretation of the world that then critiques science strictly through that lens and will not give science a fair hearing. Bad resources, on the other hand, would be those in which science is critiquing theology from a very narrow view of science and theology. We need material that will add some open and honest dialogue between the two.

Key informants assess the quality of science engaged in seminaries based on theologically receptive content or approaches, while sustaining scholarly inquiry and hermeneutics.

Advantages/Strengths

As we turned attention to advantages/opportunities to broaden science engagement in seminary education, four themes emerged:

1. Strong Access,
2. Student Responses,
3. Core Curriculum Model, and
4. Faculty Gatekeepers.

Strong Access

One advantage for broadening science engagement in seminaries is strong access to science resources, regardless of institutional structure. Interestingly, the kind of access was consistent by institutional type. Freestanding seminaries reported having strong access to online science resources (i.e., Science magazine, Science America, videos, BioLogos, etc.) and science centers (i.e., museums, botanical gardens, and more). Embedded seminaries named access to faculty in science departments on campus and university system digital libraries as their strongest scientific resources.

Debra, a key informant at a small evangelical freestanding seminary, notes, "There are a lot of resources that, if we wanted to, we could reach out to them, [like] the Center for Theology and Natural Sciences. NASA is located right out here."

Harper is at an embedded institution and contends,

> We have a pretty big university here with many different disciplines including sciences, and so our library is a wonderful resource for materials on science. A lot of access. Primarily as I said before, because we are a broad-spectrum university that provides advanced degrees on our campus in all areas, physics, chemistry, biology, psychology, you name it. We have all these different programs on campus. This university provides an optimal setting for interdisciplinary dialogue. We also have online access through our library and through our technology on campus to a wide range of resources outside of the campus.

Student Responses

In courses where science has been incorporated, interviewees discovered positive student responses, both formally and informally, for broadening science engagement in seminaries.

Oscar, an informant at an evangelical seminary, based on student surveys, notes, "100 percent positive response from students. They said it was the most appreciated part of the whole course."

Harper also reported positive reviews from students, citing students' growth, new insights, and comfort as significant outcomes from incorporating science into his course. "They say they grow and they appreciate it. They learn insights. They learn to be more comfortable with being positive about science and not thinking that science is just something dangerous to our faith."

Gina admits, "It comes as a bit of a surprise, but a positive one for most." Students initially may bring suspicions and concerns to science-integrated courses, but study participants articulate that student responses at the end of the course demonstrate the transformative effect of incorporating science into seminary education. "The students are happy to have practical things that scientific evidence provides to help them work through pastoral care, work on addictions or sexuality issues," according to Henrietta.

Core Curriculum Model

Another opportunity for broadening science engagement in seminaries, illuminated from interview findings, is the core curriculum model. A majority of participants noted that they do not have stand-alone science and religion courses, or when there is such a course, it is an elective. Only four informants could name courses designed for intricate scientific inquiry and theological reflection. Approximately 57% of interviewees in this group noted that incorporating science into core courses, whether through team teaching, faculty development, or increased funding, would be one of the best approaches for broadening science engagement.

Jacinta declares,

> Our professors in the area of Biblical studies and our professors in the area of theological studies,…would not consider a course in science to be relevant to ministerial training. They do not oppose the integration of science into individual courses, but they would not see it as a significant addition to the general curriculum as a requirement for degrees.

Lee also notes that persuasion would need to happen through the core curriculum. He states,

> Curriculum changes…can happen pretty simply if you've got people onboard to say, "this is something worth pursuing." If there is some sort of entry-level class in the seminary curriculum where we could put a unit of that into that course and say, "All right, here's a way to include science into your reflections as you go through seminary." There just needs to be a way to expose students, and probably faculty, as they prepare to integrate that approach. I think we can make use of the [science] faculty resources we have and approach these things from interdisciplinary team teaching approaches.

Faculty Gatekeepers

Lastly, 100% of respondents in this group stated the key gatekeeper for determining science engagement is faculty. While deans, presidents, boards, and denominational congregations were identified as having a role, or influencing the focus, of scientific engagement, most perceived the ultimate gatekeepers are faculty. As such, having faculty with scientific interests or backgrounds is a major advantage for broadening science engagement in seminary education. Forty percent of subjects in this interview pool hold degrees in science/engineering as well as theology. Three interviewees have advanced degrees in science/engineering. Fifty percent of subjects named two or more faculty at their institution with degrees/previous careers in science/engineering. This existing cohort of science and engineering faculty are viewed as a valuable resource that is already present at seminaries across the 14 ATS Protestant schools represented in this group. Some seminary faculty teach courses or co-teach courses in other university departments.

One respondent affirms,

> About three years ago, I graduated with a Masters in environmental science. I'm an adjunct in that department here in the undergraduate school. About one class a year, I teach in the environmental science department. The science department really likes the idea that a theology professor is

> interested in the stuff they're doing. The theology school doesn't really value the thought that one of their people is interested in science. The state university that I got my Masters [from] has invited me to teach a course on religion and the environment. To me that speaks volumes on where the desire is to engage science in our seminary.

Respondents suggested grant funding to establish a cohort of scientists, theologians, and scientifically trained theologians as an approach to broadening science engagement in seminary. They identified the need for campus champions among faculty. Yet, the campus-champion model also requires a larger network, an interdisciplinary cohort, where intellectual inquiry and best pedagogical practices are investigated/exchanged.

Barriers/Impediments

Interview findings exposed barriers/impediments to engaging science more broadly in seminary education, specifically:

1. Limited program hours,
2. Limited scientific knowledge/skill of seminary faculty,
3. Funding sources,
4. Competing interests, and
5. Low priority views.

Limited Program Hours

Henrietta describes the rapid and significant decrease in credit hours for a Master of Divinity degree as a major barrier to adding courses but is optimistic that more creative solutions can be implemented. "Our seminary used to require 96 credit hours for a Master of Divinity degree, and we, in eight years, have gone down to 75. We have cut it by almost a fourth," Henrietta reflects. "I think [science] would have to be integrated more into individual courses so that students could see for themselves the relevance of integrating science and theology," she continues. Henrietta's sentiments regarding the limitations of reduced program hours as a barrier to how science could be integrated into seminary curricula was shared by over 57% of respondents in this group.

Limited Scientific Knowledge/Skill of Seminary Faculty

Similarly, interview perceive that the limited scientific knowledge/skills to analyze and incorporate scientific sources of seminary faculty is another barrier to broadening science engagement in seminaries. Debra ponders, "I wonder if faculty would perceive that they are—if they themselves are adequately prepared to do that kind of thing." Similarly, Henry states, it would be "resistance to it. People might say, 'Are we gonna be learning something that is gonna be too difficult to think about?'" Phillip also believes that his fellow seminarian colleagues may be afraid to engage science more broadly in their courses, due to skill. He suspects they will question if they "have the expertise or the knowledge."

Debra states,

> It would take some real convincing for my colleagues to see it as relevant to the work that they need to do and the effort that they would need to put into it to feel like they were well versed enough to incorporate it into the classroom.

As a result, interviewees determined that faculty development would be key to engaging science in seminaries.

Funding Sources

Funding sources are categorized as a barrier, in terms of direction, sufficiency, or inter-institutional/interdisciplinary sustainability. Interviewees discussed the need for particular types of funding in

order to enhance faculty development; establish interdisciplinary, scholarly, open-inquiry science-theology communities; and sustain a publishing, as well as core-curriculum, science-integration agenda.

Mark contends,

> [We need] to have a specific stream in our undergraduate theological training that deals explicitly with science. It would be theology and science as a major…There's just no money. If Templeton or the AAAS was to give us $100,000 to start something up, I think there would be lots of attention. I don't really see faculty funding for research purposes to be useful because I think that already exists institutionally.

Brian suggests that seminarians (faculty and students) require, "getting out there to get to know scientists on their own turf, their laboratories or their planetariums or their observatories. Further interaction with scientific communities…more funding to provide for that."

Debra concludes that science engagement at her institution would be less impeded by,

> Grants to develop faculty. Faculty development in terms of educating faculty members to understand the importance of [science integration], the relevance of it, to be able to envision how it could be done modular in some sense, where there will be movable pieces that could be fit into different career path.

Competing Interests and Low Priority

The final barriers/impediments to engaging science in seminaries were associated with competing interests as well as the low priority science has in theological education. While respondents had a strong interest in the integration of science into theological education, they perceived that their colleagues and institutions view science as a non-critical or low-priority element of theological formation.

Harry summarizes it in this manner,

> I think the barrier we might encounter would be the perception that we are doing something more than we need to do, when it sometimes seems we have so much to do already and perhaps not enough time to do what we want to do in our education work. The barrier may be—is—might be the question, isn't this unnecessary, or isn't this a distraction?

Jacinta, a key informant at a freestanding seminary in proximity to a university, acknowledges,

> I wish our engagement in science was more than what it is. One of our professors, here at the seminary, spearheaded a conference at the university, although she's not faculty at the university, but through personal relationships got the university to sponsor a conference on science, the environment, and religion, probably four or five years ago. Unfortunately, she didn't feel that our seminary would be interested in sponsoring that kind of conference. They were very happy to have some Nobel Prize winning scientists to come and lecture on their campus. I wish that our campus had a greater interest than it does.

It is worthy to note that all five barriers/impediments were strongly interconnected for interviews. To address one area would require addressing other areas simultaneously or equitably.

Key Findings/Major Themes (Group 2)

Participating in this project from a social constructionist approach, the researcher acknowledges her part in constructing an account of science in theological education based upon her interpretation of the interview content that faculty shared. Her hermeneutics is informed by her social location as a middle-class, Christian, woman of color. And she is a practical theologian with commitments to a critical-liberative praxis. In other words, elements

of this report of findings from group 2 interviews bubble up from a listening posture that leans into the peripheral voices and that is curious about resistance. And informed by a grounded theory approach, she understands that a single portion of the interview data itself could substantiate a theme or topic to be more broadly explored in all the interviews. With the exception of one particular theme, the decision to report on certain concepts was based upon the frequency of these in both mainline and evangelical traditions. In so doing, the aim was to present material that interview data suggest is salient across a theological spectrum and thereby removing a facile and one-dimensional conclusion that theological perspective is the sole reason for an emergent theme.

A Complicated Relationship between Science and Theology

Because the interviewees were interacting with different questions that were unified around science in theological education,[5] their responses oftentimes reflected their views about the broader issue regarding the relationship between science and theology. Thus, while discussing science areas, sources for science, the relevance of science in theological education, and the integration of science and theology, interview responses illumined a broader narrative about the real and hoped-for relationship between science and theology.

The relationship between science and theology is couched in a broader conflict narrative that is apparent in the interview data. Respondents in this group, from both ecclesial traditions, name this conflict model (prevailing science-versus-religion narrative) in discussing the relevance of science and its place in theological education. They also allude to it in their assessment of students' responses to science and theology. Interviewees mention the animosity and the disconnect that generally characterizes the relationship between science and theology and for respondents from the more evangelical traditions, science is perceived as a danger and threat to faith for important constituents of their schools who provide funding and who have a say in where students enroll. While professors are convinced of the import of integration and their rationale for this conclusion (interviewees articulate different rationale), they are well aware of the discourse around science and faith (science is irrelevant, science is dangerous) that permeates church culture. These points are articulated in comments such as the following:

> There's no way to have an integrated, coherent faith without addressing the integration of faith and science, in my opinion. (Doug Smith)
>
> I think several of our faculty, there would be topics that they could bring science into that would be helpful. I don't see them as in any way doing the job that encourages an anti-science attitude. I think sometimes the concern is that the church itself is what's fostering an anti-science attitude. (Mark Reynolds)
>
> When you get into evangelical type churches, charismatic Pentecostal churches, the capacity to talk about science diminishes, and that is largely due to a part of the evangelical more conservative churches in the sense that science and religion are in conflict. (Stuart Sand)
>
> There's no escaping science fact or science in terms of culture. If believers and theologians do not ever bring up science…they create a chasm between the two different domains. They may be different, but they are, in a way…they should be related to each other because, the questions they ask, theology and science, quite often times, they overlap. (Jason Kepler)
>
> About the creation-evolution topic an interviewee states, "Rather than a sense of fear, but a sense of wonder and worship. I think that's critically important." (Michael Preston)

[5] For instance, "How would you describe the relationship between science and theological education at your school?" "How is science relevant to theology/ministry at your school?"

> I think people think compartmentally, they put religion one side, science on the other. No sense of how the two overlay or integrate. (Walter Fines)

Interviewees in this group are also aware that science has been an important dimension of the cultural milieu and is motivating engagement around significant issues.

> "I think that clergy needs to be informed about various science topics that even the wider public are interested in." The interviewee then names global warming, environment, and bioethics. (Jason Kepler)

> I think it's true that a lot of people in the religious community don't realize how big a factor science is for their laity who are exposed to general culture. (Patrick Milton)

> We often gloss these as science versus religion or science versus theology or science versus faith, but the reality is maybe 90% or more of the science that most people sitting in the pews will confront, they've got no problem with at all. (Brad Jacobson)

And across ecclesial family distinctions, interview data show that there is energy around efforts to forge scholarship and instruction that is founded upon a more amicable relationship between science and theology.

> We have potentially two bodies of truth, each carried by different methods that somehow have to be reconciled, harmonized. My word would be integrated, but not in a simplistic way. (Patrick Milton)

> At the same time, I like to caution scientists, and then, also people who are fairly excited about science, that science does not carry all the answers. They don't have all the answers about the questions they ask, and so it creates, also, opportunity for theologians to contribute to the conversation. To enrich their understanding of reality. (Jason Kepler)

> How does God still speak? One of the ways is through the hard work and the investigation of natural scientists. How do we tune into that? (Carl Reese)

A distinctive element of the integration of science and theology that surfaced in interviews with informants from evangelical schools in this group is a link between science and human sexuality.

> The science behind gender dysphoria, or intersexuality, or these kinds of things is very charged, the general topics of homosexuality and Christian faith are generally charged. To even go into the science of it has this overlay of this is potentially dangerous territory to get into. (Doug Smith)

In response to a question about areas of science being considered "off limits," an interviewee answered, "anything related to homosexuality." (Stuart Sand)

Is There a Professional Ministry Bias?

From a qualitative, narrative research standpoint, power dynamics[6] can shape analysis and interpretation[7] and given my role as researcher-writer and my commitment to critical-liberative praxis, it is important to give voice to the streams of thought that are less prominent and thus viewed as outlier perspectives. A faculty member from a mainline Protestant school shared an observation that was not explicitly repeated in any of the other interviews. This less-represented observation was instrumental as another way of categorizing the way that various schools understand the engagement of science in theological education. Responding to the prompt about resources that address science and theology[8] this faculty stated,

> I think that the resources, to me are pretty severely biased in the direction of theism. We're not the only field that's like that. I think it draws on philosophy of religion. It's also pretty seriously biased in the direction of theology-science dialogue. We don't use science to do research on religion in the dialogue field. You just haven't questioned theological issue. You encounter science that makes you think, and then all of a sudden you're having a theological discussion about science that's kind of dialogue question. That theology-science dialogue is really important. It's mostly important in a professional setting, so for this particular group with this particular belief, it's how science hits that particular group with that particular issue. (William West)

Later, this interviewee described science as a means to understand religion, religious behavior, and religious experience rather than science as solely a dialogue partner. There is a distinction made about how science is engaged. Interview data suggest that a theistic orientation and the professional ministry setting of schools influences the assessment of integration resources and the types of science beneficial to ministry and more readily integrated into courses.

> I would like to have a new Ian Barbour to write across the disciplines of science with a fully theologically informed perspective and a capacity to cross disciplines while not over-simplifying and being fair to both fields. (Christine Abbott)

> There's a broad acceptance of what social science can offer, even to the point of—we have a required senior course that everybody has to take….They're expected to demonstrate the ability to integrate across different disciplines, which sounds really great, although, the natural sciences aren't at all brought up. (Ronald King)

> I'm not sure I can think of a good example where an academic theologian engaging science focuses on a question that is irrelevant in the context of pastoral ministry. It's not to say that the writing style, the jargon, the examples, the mode of engagement is easily comprehensible to people in pastoral ministry or to a wider audience. I think that's a bit annoying to see writing that almost deliberately seems to want to shoot over the heads of ordinary people with big words, big names, preferable other languages… (Carl Reese)

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[6] Cigdem Esin, Mastoureh, Fathi, and Corinne Squire, "Narrative Analysis: The Constructionist Approach," in *The Sage Handbook of Qualitative Data Analysis*, ed. Uwe Flick (Los Angeles: SAGE Publications, 2014), 206.

[7] Kathryn Roulston, "Analysing Interviews," in *The Sage Handbook of Qualitative Data Analysis*, ed. Uwe Flick (Los Angeles: SAGE Publications, 2014), 298.

[8] Interviewees used the terms religion, faith, and theology in their responses. It would be interesting to explore further the distinction of these terms and how they are used.

> I think you could say that was the sweet spot of where the intersection of neurology, cognitive science and pastoral practice meet. (Henry Miller)

These excepts suggest that there is a benchmark or standard by which science and science resources are assessed. Put differently, science is favorably evaluated if it meets the expectations of theological education for professional ministry. There is a qualitative distinction made about science that engages practice, is accessible to pastoral ministers, and that is relevant to theology.

Areas of Science and Theological Education

Related to this last point, the interviewees in this group readily talked about the different areas of science and implied how some of these are more fitting for a theological education setting. While it is possible that one of the earlier interview questions introduced categories of science ("What types of science does the institution feel is relevant?"), it is interesting to note that science is not understood as a singular phenomenon but that there are types of sciences for differing constituencies. For example, it appears that for some interviewees certain science areas are more compatible with ministry.

> I also think that something that may take a bit of heightened interest in our divinity study are those parts of research in the natural sciences that deal with human behavior because they will impact your understanding. The work in neuroscience affect—we've got two faculty members here really, one in bible and one in Christian formation, both of whom are very interested in that. Because the way it reshapes their assumptions and understandings about how to cultivate Christian development. They would argue that that's more important thing than say evolutionary-like models of biology or evolutionary psychology or whatever. (Mark Reynolds)

> Now, we have faculty who have interest in astronomy and the like. One person is a, by his own definition, an amateur astronomer. He's a [inaudible] theologian. He considers these things all the time with faith and science. I wouldn't say that's where all the students or our constituents are coming from. I think when it comes to seminary, the counseling domain would be far more pressing. Counseling and things of that sort at the seminary level. (Michael Preston)

> The type of science that has been helpful has been in one area, in anatomy, disability studies, studies in addiction. Another area has been in behavioral studies. (Walter Fines)

> They're expected to demonstrate the ability to integrate across different disciplines, which sounds really great, although, the natural sciences aren't at all brought up, but the social science, they are expected to integrate social science. By that, they mean, have you paid attention to the literature on leadership models and how well they work in church congregations? That sort of thing. On some level, everyone is encouraged to be engaged with science, but it's not science at large. (Ronald King)

> If it's on questions like cosmology, fine-tuning of the universe, and notions of God based on that, that would be a much smaller segment of people would be interested. They would be interested, but so I'd say it would be the sciences that could marry up pretty evidently with practice in a pastoral sort. (Henry Miller)

> There are Master of Divinity students that have a major in, or that are majoring in counseling would be doing more of the, well, social sciences and psychology obviously. If we widen the definition of science to include all that, then they're certainly doing more of that than the other majors would be. (Nick Ashton)

> I should say that I think there are a minority of folks here who think that Christians should, basically, reinvent science, and I don't think it's because, at least not entirely because, they see modern science as conflicting with certain biblical and theological claims, but because they are so committed to this fully integrated type of view that they think a fully integrated science is going to be a Christian science, and so it's going to bear certain marks that distinguish it from the science that the non-Christian world does. It's sort of integration taken way out there to a point that I think would make some folks uncomfortable because then it's almost a postmodern view of science. Everybody could have their own science, depending on what other commitments they're bringing to it. My guess is most philosophers of science would find that very uncomfortable. (Brad Jacobsen)

> There's a big, big presence of religion and science here, but that's fundamentally in the graduate school among the faculty and among the PhD students. We do have a masters specializations in religion and science, and we get half a dozen people a year to put into there probably. That world is really powerful at [THEOLOGICAL SCHOOL NAME], but it's also so separated from the world of education for people who are planning to go into the pastoral ministry. That's what I mean by complicated. You've got all these world-class heavy hitters around all over the place, but they're not normally teaching intro classes, too, in theology, or bible, or anything. (William West)

Primary Role of Faculty in Engaging Science and Its Integration with Theology

Across ecclesial family affiliations, this group's interview data strongly show that the integration of science and theology is largely in the hands of individual faculty members. And in a few cases, the informants expressed concern that when the grant period ends, deliberate efforts to integrate science in their schools would come to a halt. This concern mirrors the sense of a loosely held institutional commitment to integration. Thus, a robust and systemized integration of science and theology would be an anomaly and more often it seems to be the case that faculty members, according to their professional and personal interests, are critical resources for science and its integration. It also appears that the primary role of the faculty is related to the perception that science is a highly specialized and esoteric corpus of knowledge. Thus, if the faculty person is not an expert, a school will not have the capacity to be intentional about engaging science.

> I have a PhD in chemistry and quite a few of my colleagues have at least a bachelor's in one of the sciences. We have some knowledge from that, but I think primarily the information we gain is from reading the word of other scientists. (Henry Richards)

> Speaking about a colleague, one interviewee remarks, "He's developed a course for the last decade called something like Human Nature and the Social Sciences. If he hadn't been here with his background expertise in the social sciences, probably that wouldn't exist either. It's not like we said, 'Hey, we've gotta have somebody teach this course.' It's really the reverse. 'Who do we have for purposes of the required stuff? If they have any expertise, maybe they wanna offer electives." (Patrick Milton)

Responding to the question about who it is at the school that determines the relevance of science, one interviewee said, "I would say it's largely a matter of the individual faculty person and their research agendas." The respondent elaborates that three of their faculty members are medical doctors and that the school recruited scholars with interests in agrarianism and ecological and environmental sciences. (Mark Reynolds)

> My colleague in ethics is interested in biomedical ethical questions, and that makes a science connection for his course as well. (Christine Abbott)

> The science of origins, evolutionary theory, that attracts our attention as well. We pay attention to that. Biology. I'm a chemist. What else do we have? We just hired a post-doc in science and theology who is a health scientist, so I think with an emphasis on genetics…. (Henry Richards)

> We haven't made it a centerpiece, but we have constructed a couple of courses that do give opportunity for—it's an elective course, the one that I teach. A good percentage of our population take the course. Otherwise, they'll get some casual coverage on the relationship between science and faith in some of the historical theology and contemporary theological trends sorts of courses. Nothing real deep in those courses. (Doug Smith)

Perception of Students' Ambivalent/Negative and Favorable Responses to Science Integration

One final topic that was mentioned by informants from both ecclesial traditions in this group is the spectrum of student responses to the integration of science. Interview data suggest that there is no uniform student response to the integration of science and theology from mainline and evangelical schools. Interviewees describe students' ambivalence and the more negative and favorable experiences they are privy to.

> Some are quite open to it. Others are quite open to it until you start putting two and two together. That is when they are helped to see how it is that some scientific ways of thinking present whole new ways or different ways or challenging ways to think about, or seem to challenge directly categories of Christian theology, then you get a resistance. (Doug Smith)

> If you don't have a theological system that has a robust creation mythology, you are lost. I've seen that lostness occur to some students. It's a terrible thing to do. The ethics of teaching, where you destroy the naiveté of folks. Man oh man, one has to handle those carefully. (Doug Smith)

In response to a question about students' response to the integration of science in courses, one interviewee remarked, "Oh, they love it." (Jason Kepler) and "I think our students have really found it meaningful." (Michael Preston)

> I would say the response has been almost universally positive. I'd say it ranges from the people who already had some science background or interest and were just incredibly enthusiastic…that would make up the large majority. Then, there are a few who felt, I think, that—not so much threatened by the discussion as it was not their priority; not their cup of tea. (Henry Miller)

> They want to do bible, they want to do some of the core curriculum, but Christian ethics in terms of climate change or creation care, that's not on the horizon of a whole sector of our student body. (Nick Ashton)

An interviewee is sharing his perception of the way a student may respond to science in class and states,

> "Okay, I'm in a theology class, and the theology professor is talking about stuff I've kind of thought about, but you can't, maybe, talk about it in church with fear of being labeled a liberal, and so it's good to hear the theology professor talking about these things in a way that, maybe, they were—," direction they were headed already. (Stuart Sand)

Justice and the Integration of Science

The perception of student responses and the conviction of a few interviewees in this group, from both mainline and evangelical schools, direct our attention to a justice issue pertaining to the engagement of science. A few interviewees share their concern for African American students whose social and historical contexts give ample reason to view science as a threat. This is an all-too-critical issue that must factor into any conversation about the place of science in theological education. This informed and responsible critique of the way that science has been

used to oppress and harm must challenge any attempt to make normative a singular construal of science and its place in schools, churches, and in individual and communal lives. This justice dimension is evidenced in these direct quotes from professors.

> Where I will say, however, that is challenging to engage with science—it's not necessarily irrelevance as much as it is—the word is escaping me here, but science is still—as its practice, science is still a largely an opportunity for the privileged in our country, so this gets back to the social issue. My African American students, for instance, when I start talking about science, they just shake their heads because, first of all, they usually come from fairly conservative traditional congregations where they might be able to…for instance, but the other reasons is that the black community in general in the United States does not perceive science to be their friend. They see the way that science has been used to actually justify their treatment. (Ronald King)

> I think our students are—they're very leery or anxious about the ways in which science can be used as a source of domination…. (Henry Miller)

> I'm not sure it's helpful with all the students in addressing some of their anxieties about evolution. I think just to be very frank about it, I think some of the African American students are particularly sensitized on this point because they know how these things have been spun in the past. They're apprehensive about a white guy theologian standing here talking in positive terms about evolution. (Carl Reese)

And while the following quote does not mention discriminatory and oppressive uses of science, it would be short-sighted to disregard socio-historical contexts that inform church affiliation. In other words and related to the following quote, what else informs the students' "struggle" and discomfort around engaging science?

> Approximately 45% of our students are African American, many of them coming out of Pentecostal or Missionary Baptist, AME traditions. They sometimes struggle a bit with the engagement around science. If they have come from a background that's more Biblical literalist, they've got a further distance to travel to make connection with the kind of thing that I will be saying…I do now and then get, "I really couldn't talk about that in my local church" or "We're seven-day creationists. If this isn't the way it is, then what else is up for grabs in the Bible." (Christine Abbott)

And again, with regard to international students, aside from alluding to the difficulty with language, why are these students uncomfortable?

> I suspect that some of our students, especially who are coming from overseas or from outside of the United States and Europe are a little less comfortable with a full-bodied integration with science. We do have a lot of international students. Of course, we do instruction, officially, in three different languages. Part of that reflects the diversity of our student body, and our students from Africa and East Asia and Latin America often are a little bit more wary, more cautious on these things. (Brad Jacobson)

These curiosities and the comments from the above respondents provide some context for the responses from an informant at a seminary of a historically Black theological school. This interviewee paints a bleaker picture of the faculty's receptivity to the integration of science, and while the respondent shares a possible reason for this, it is impossible to know, if any, other reasons. It is compelling to juxtapose the following quotes with the perceptions of the other interviewees related to the African American students at their respective schools.

> Persons in the university who are in the science divisions, I have found them to be more enthusiastic about the whole conversation about religion and science. Colleagues within the [THEOLOGICAL

> SCHOOL NAME] have been very reluctant to participate. It's been very challenging to encourage other faculty members to be a part of it. One way that I was able to get some on board was offering some financial incentive, that if they would redevelop their syllabi to address science at relevant points with their subject matter, then they would receive some financial reward for that. (Walter Fines)

In another section of the interview, this respondent attributes the lack of science engagement with the theological disciplines to the faculty's tendency to "work in silos." Additionally, this interviewee indicates that it has been very challenging to have faculty collaborate with other scholars.

Study Limitations

The aim of the ESS interview phase was to obtain a micro-level analysis of science engagement in seminaries. A micro-level analysis often is limited to a small sample size, due to time and resources required for in-depth data collection. While the sample size of 29 key informants from ATS member schools may limit the scope of generalizability of findings, we have found that it strengthens the macro-level analysis obtained through the survey phase with a larger sample of ATS faculty. The ESS interview phase provides a more in-depth understanding of seminaries' engagement with science as represented through the experience, knowledge, and perceptions of key informants. Additionally, efforts by research consultants to glean themes, through grounded coding and analysis, that were consistent across multiple informants narratives, further strengthens individual claims as representative of the larger cohort. The sample is also strengthened by its representation of various ecclesial family affiliations, institutional structure types (freestanding and embedded), geographical locations (east, west, north, and south, U.S. States as well as Canadian institutions), size, and denominationality. See Appendix A for distributions along a variety of institutional characteristics. Limitations notwithstanding, many of the narrative themes align with findings from document analysis, related to patterns of institutional engagement, and from survey findings, related to individual faculty perceptions about the receptivity of the field by students. In particular, the informants' narratives are rich with detail and thoughtful observations that shed light on challenges and opportunities to enhance seminaries engagement with science in meaningful and productive ways.

SECTION IV: CONCLUSIONS

Summary

ATS staff and research consultants completed the interview phase of the research project over a six-month period. Findings from the ATS ESS qualitative study are consistent with several findings acquired during the faculty survey phase and institutional document collection and analysis phase of the larger project.[9] The main findings of the interview phase include the following:

(1) Most key informants rank science very high among current cultural issues that are relevant to clergy preparedness, noting the implications of the relationship science has with how people view, care, and manage everyday life. Interviewees understand that science, as a subjective entity in itself, has the capacity to effect change in the subjective realities of faith, theology, religious practices, and the church, and to experience this mutual exchange is a welcome venture.

(2) Most Protestant seminaries have faculty who engage science in the classroom. However, quality engagement occurs through faculty with scientific backgrounds, guest science lecturers, and adjunct/visiting faculty teaching elective courses on science-theology topics.

(3) Incorporating science and technological studies into core courses produces results that have a positive effect on the quality of seminary education, namely, theological reflection, student responses, and faculty development.

(4) Because interviewees want to engage science, because they are convinced that science-theology exchanges must involve more than a select few, and because they see theology and faith richer for science, interviewees are vocal about science fitting into their pedagogical aims and commitments.

(5) Faculty are the key gatekeepers for engaging science in seminaries. They serve as both promoters of scientific engagement, stemming from interest and background, as well as barriers to scientific engagement, rooted in competing interests, priorities, and the lack of greater institutional support.

(6) Interviewees expressed a distinction about areas of science. More specifically, there is the sense that certain fields are more compatible with and beneficial to pastoral ministry.

(7) Interview data indicate that for students, the science-theology interface is not simplistic and not merely a cognitive activity. For students, to engage science involves more than their intellect and touches upon Christian faith commitments.

(8) The implicit and explicit concerns about science in theological education urge caution in the ongoing exploration about science's place in theological education. The history of science in the western world and, more specifically, how it has been used to justify inequality, oppression, and the mass destruction of people groups must serve as a critical caveat to any deliberations about the interface between science and theology.

[9] Key findings of the faculty survey have been provided as a reference: (1) Most Protestant seminaries have faculty who engage science in the classroom (2) Engagement with social and behavioral sciences dominate in both the classroom and faculty scholarship. (3) Science engagement among faculty in Protestant seminaries is not an issue of theological tradition; there is no evangelical or mainline divide. (4) Faculty do express concern regarding student preparation to deal with science in their future ministries. (5) While faculty feel supported by their institutions to engage in science, a majority feel their institutions could be doing more to improve the school's engagement with science.

The conversation around science and theology is multi-faceted and warrants an open mind. And while there are characteristic dimensions of the poles of theological expression in theological schools, informants provide their particular perspectives that together form a picture of a shared aim to foster more interaction between science and theology. It is especially valuable to underscore the fact that the voices representing different schools understand the numerous cultural milieus in which their teaching and exploration exists. And despite the accompanying pressures and risks to viability and sustainability for some, there is the commonly held recognition that science and theology can no longer co-exist on separate islands. The outcomes of the co-mingling of the two discourses will look different, as these are informed by the intellectual and confessional commitments of the theological communities that gather to listen for insight, discovery, and mystery in the science-theology dialectic.

Implications

Findings suggest there is a rich and vibrant landscape for broadening science engagement in seminaries. The data show interest and relevancy throughout Protestant schools, regardless of size, structure, primary denominational family, or location. The approach to broadening science engagement in seminaries does vary by structure. Embedded seminaries have access to scientific faculty, large digital inter-institutional libraries, and knowledge resources that lend towards collaborative, co-teaching, innovative curriculum changes. Freestanding seminaries have access to online resources and surrounding science centers that lend towards more modular and campus programming integration of science. Furthermore, the paradigm shift will require a strong science-theology cohort to be established across seminaries, potentially through ATS, that can provide resources, support, and scholarly networks for sustained and enhanced engagement, as scientific knowledge and background of faculty, students, and congregants continue to increase. Another strong implication from this study is the need and desire to address the perceived science-theology gap during a time that science and technology is prevalent in/for many aspects of everyday life.

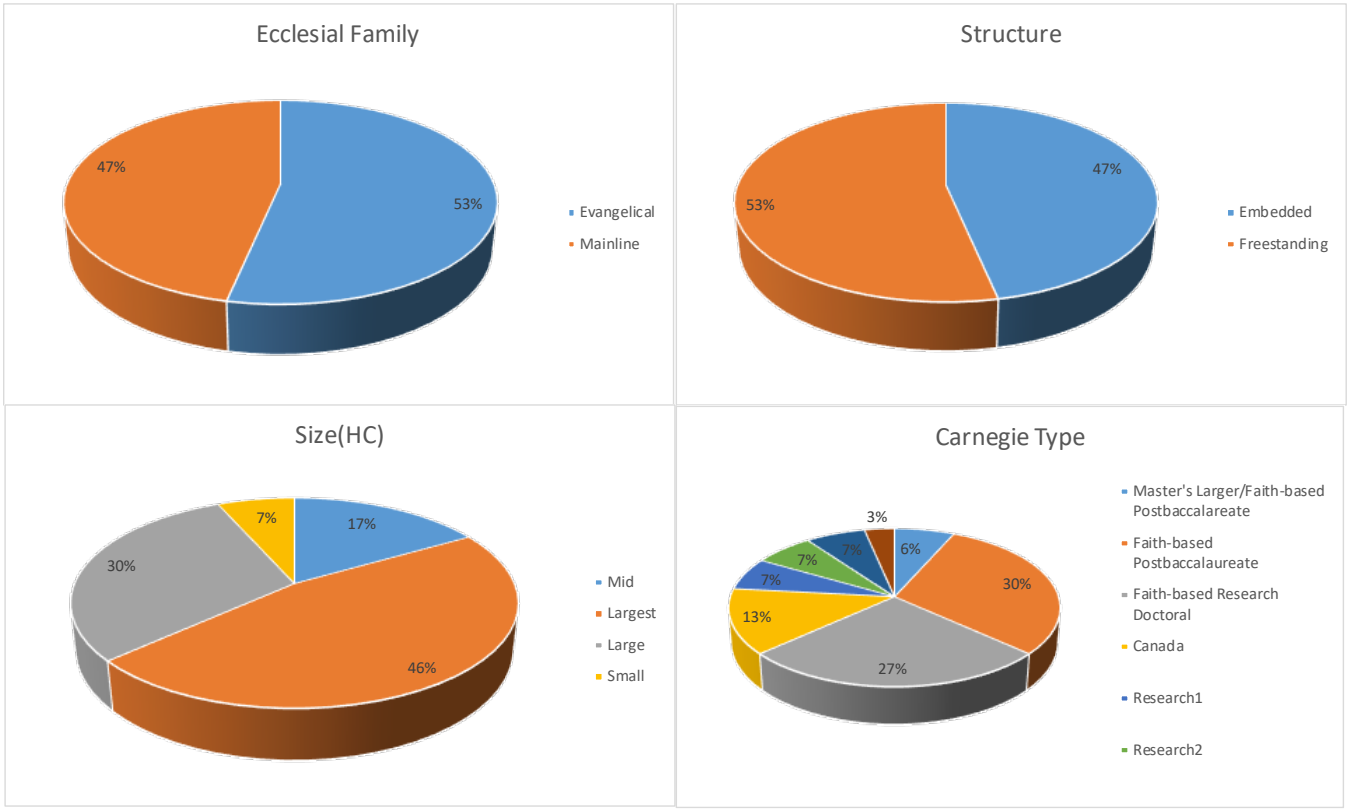
Next Steps

In review of the data, the following next steps are proposed:

1.) Identify thematic strands and synergies across all three phases of the ESS research project. Commission a task-force to create action/research agendas from cross-phase thematic findings. See *Theology of Joy and the Good Life* research project at Yale Center for Faith and Culture as a reference. http://faith.yale.edu/joy/about.
2.) Establish a Dean/President consortium that will pledge to engage more science in seminary education. A similar practice was established by deans of engineering schools to enhance diversity and inclusion on college campuses throughout the United States (See http://diverseeducation.com/article/77545/).
3.) Identify/establish a science-theology faculty cohort that are/can be both scientifically and theologically trained and are willing to create curriculum modules and best practices for engaging science in seminary classrooms. It is recommended that the interdisciplinary cohort include science, engineering, and theology faculty. Cohort may require research incubators (innovation centers) where faculty are accommodated as fellows/research associates and can dedicate scholarly time and effort for one-to-two-year periods.
4.) Charge science-theology fellows to develop 3 to 4 test core curriculum courses that intentionally engage science (particularly the top 3 areas of science illuminated by this study—environmental, medical sciences, and digital technology studies) in core seminary courses. Implementation should include integration of modules rather than creation of stand-alone elective courses and should address differences in language, ethos, historical heritage of ATS schools, by ecclesial family affiliation. Identify seminaries that are willing to implement modified core curriculum as a part of a test program.
5.) Conduct a detailed evaluation of test program by external consultants.

APPENDICES

Appendix A: ATS ESS Interview Pool by Institutional Characteristic



Appendix B: ATS ESS Interview Protocol Instrument

Association of Theological Schools **Engaging Science in Seminaries Research Project | Interview Protocol |**		
TOPIC	**QUESTIONS**	**COROLLARY AIMS**
Introduction	• Thank you for agreeing to be interviewed for this Engaging Science in Seminaries project. I'm [CONSULTANT NAME], a research consultant with ATS. • We are interviewing key informants at 30 ATS Protestant schools to get thicker descriptions of institutional engagement with science. The study is being funded by the John Templeton Foundation. You have been identified as a key informant at your institution for this topic. • For the next 60 minutes, I would like to talk with you about what [THEOLOGICAL SCHOOL NAME] is doing with regards to science. • I have three topics I'd like to get through, some with several follow-up questions. The total interview is projected to last for about an hour. • The interview will be recorded, and we will treat your answers as confidential. Only the ATS Director of Research and ATS research consultants will have access to transcripts. Transcriptions will go through a de-identification process before any reporting is done. • Do you have any questions about the study? The session will be recorded, and permission to record signifies your consent to participate, as outlined in the informed consent agreement we emailed. May I have your permission to record the interview? • [After starting recording:] Today is _____, the time is _____. I am ATS research consultant [CONSULTANT NAME] and I am here with interviewee. Please state your name [INTERVIEWEE NAME]. Thank you.	
Clergy and Culture	• What do you believe are current issues that clergy should be ready to address? PROBE: Where does science rank with these issues*, with regard to clergy preparedness? *(If not many current issues were named, include a few of the following as examples: pop culture, current events, politics, arts, film, technology, other religions) • How is science relevant to theology/ministry? How is science irrelevant to theology/ministry?	*Climate* *Quality/Type*

Association of Theological Schools Engaging Science in Seminaries Research Project | Interview Protocol |		
TOPIC	**QUESTIONS**	**COROLLARY AIMS**
	• How would you describe the relationship between science and seminary education at your school? PROBE: What are the school's sources for science? Researcher note: Here, sources are referring to more than just stable resources, but trying to determine what is the quality of science at their school. Who do they listen to? Who's considered authoritative? Is it only old, outdated sources, etc.?	
Science on Campus	• What types of science does the institution feel is relevant? PROBE: What areas of science would be considered "off limits" at your school, if any? Why? • Who in your seminary determines the relevance of science? PROBE: How do they perceive science to be relevant/irrelevant for your school? • ATS conducted a survey with ATS faculty which revealed that a majority of faculty believe science is being engaged in their classrooms. In the courses that engage science at your school, what does the science-theology integration look like? PROBE: How have students responded to the integration of science in these courses?	*Climate* *Quality/Type* *Advantages/Strengths* *Barriers/Impediments*
Resources	• What kind of access[+] does your school have to science? [+](If having trouble with understanding "access", suggest the following: science courses, science-and-religion courses, centers, research programs, journals, or nearby scientists, collaborations, etc)? • If your institution were considering a curriculum revision to incorporate more science, what would be the best way to do that at your school? PROBE: What barriers would you anticipate encountering in such a revision? (If having trouble with curriculum revision ideas, suggest the following: --revise existing course or create new ones? --new modules within existing courses or fully dedicated course? --required or elective courses? --course-level or program-level outcomes or neither?	*Quality/Type* *Advantages/Strengths* *Barriers/Impediments*

Association of Theological Schools Engaging Science in Seminaries Research Project | Interview Protocol |		
TOPIC	**QUESTIONS**	**COROLLARY AIMS**
	• What are your impressions of existing resources[#] on science and theology? [#](If having trouble naming "existing resources", suggest: existing scholarship at the intersection of science and religion; DoSER program—Dialogue on Science, Ethics, and Religion…part of American Association for the Advancement of Science; Science and Religion group at AAR; Zygon journal) PROBE: What do you/does your school consider to be good resources on this topic? What are bad resources? • If more science engagement in seminary were a goal, how would that goal best be attained? PROBE: Would any of the following be effective or attractive to you? --science education for seminary professors --research funding for faculty --extracurricular programming --other creative projects (like Princeton's new farminary)	
Final Thoughts	These were all the questions I wanted to ask. • Do you have any final thoughts about your school's engagement with science that you would like to share? Thank you for your time.	*Climate*