



## Science for Seminaries: Measuring the Impact of Equipping Future Religious Leaders to Engage with Science

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Faith leaders are important community guides in issues of science and society, but few have formal scientific backgrounds. The Science for Seminaries project of the American Association for the Advancement of Science's Dialogue on Science, Ethics, and Religion program provides grants to seminaries to incorporate science engagement into the core theological education of future faith leaders. From 2014 to 2022, the project provided grants to fifty-four seminaries, which modified over 280 courses to include science topics from a variety of disciplines. A comprehensive evaluation of the project found significant positive impacts on seminaries' engagement with scientific topics, students' perception of science and connection with scientists, faculty engagement and networking, and project sustainability. The Science for Seminaries model has been shown to be an effective and impactful approach to equip faith leaders with needed skills and resources for engaging science in their ministry contexts.

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## Introduction and Project Background

Although the level of religious participation and identification has been declining in the US, a strong majority of US adults (69%) still identify as religiously affiliated, and even more (74%) say religion is somewhat or very important in their lives (Pew Research Center 2021). Among other things, people's religious faith can influence their views on scientific topics (Pew Research Center 2015). While there is a widespread perception that science and religion are at odds with one another, this does not seem to be reflective of people's personal experiences. For instance, the Pew Research Center found that while 59% of US adults said science and religion are often in conflict, only 30% reported that science even sometimes conflicts with their own religious beliefs (Pew Research Center 2015).

Congregation members often look to their religious leaders for guidance on navigating issues in their lives, and many of these issues involve the interpretation and application of science. During the COVID-19 pandemic, religious leaders found themselves in the position of making public-health decisions for their own faith communities, such as whether and how to gather for worship (Conger, Healy, and Thompkins 2020). Their decisions also influenced the personal public-health decisions of their community members, such as whether to get vaccinated (Muller 2021). Beyond public health, faith leaders are often seen as guides for a wide range of emerging topics in science and society, including how to understand and interact with artificial intelligence and the existential questions these technologies raise, how to navigate personal choices around healthcare and end of life decisions, and what stewardship responsibilities individuals and communities have in addressing climate change, among many others. Other areas of concern for faith communities also frequently have important connections to science. Issues of social and economic justice intersect with conversations about disproportionate impacts of and access to scientific discoveries and technological advancements, while concerns for food security involve considerations of environmental impacts, the genetic modification of food crops, and access to clean water.

Despite having a central role in science-engaged conversations and decisions, few current or future faith leaders have a background in science. The Entering Student Questionnaire carried out by the Association of Theological Schools (ATS) for the 2021/22 school year found that less than 28% of entering seminary students had an undergraduate degree in the sciences, with only one-third of those being in the natural or physical sciences (Association of Theological Schools Commission on Accrediting 2023). Without an academic background in the sciences, religious leaders may not be well equipped to guide their congregations in addressing scientific issues. They may not know where to go for reliable scientific information or how to interpret and evaluate it, much less how it relates to their ministry and communities. A 2016 survey of

faculty at ATS Protestant seminaries found that only 21% of faculty agreed that their students were “well prepared” to address scientific topics in their future ministries (Hill and Gin 2017, 117).

By contrast, the vast majority of Christian pastors have at least some seminary training. A 2008 survey of more than 1,000 Protestant pastors found that two-thirds had at least a master’s degree and 85% had taken seminary classes (Lifeway Research 2010). Incorporating science engagement into seminary education could therefore be an important avenue for familiarizing future pastors with scientific topics and preparing them to address these issues in their ministry. Discussing science topics in seminary is not a wholly novel approach. For example, a 2016 ATS faculty survey found that only 7% of respondents said they never taught or discussed science or science-related information in the classroom, while 14% said they addressed them frequently (Hill and Gin 2017, 104–5). Of scientific topics discussed, social science and psychology were most likely to be addressed (reported by 73% and 56% of faculty, respectively), while subjects such as physics and earth science were addressed much less frequently (28% and 27%, respectively) (Hill and Gin 2017, 109). Perhaps not surprisingly, faculty who had some graduate training in the sciences were most likely to include science engagement in the classroom, and the topics discussed were those the faculty felt most prepared to teach (Hill and Gin 2017, 106–7). Of the 27% of faculty who reported that they would like to spend more time on scientific issues, around half indicated that the factors impeding them included a lack of time to prepare and not feeling knowledgeable enough (Hill and Gin 2017, 110–11). However, while faculty felt there was some institutional support for addressing scientific issues, more than half indicated that their seminary could be doing more, with class or curriculum changes being the most frequently suggested avenue for engagement (Hill and Gin 2017, 120–21).

In response to this need, the Science for Seminaries project was originally developed to provide future religious leaders exposure to science engagement as part of their core theological education. From the beginning, this project was a collaboration between the Dialogue on Science, Ethics, and Religion (DoSER) Program of the American Association for the Advancement of Science (AAAS) and the ATS, the largest umbrella organization for North American seminaries, representing more than 270 theological schools and supporting and accrediting graduate schools of theology in the United States and Canada (Association of Theological Schools, n.d.). The AAAS is the world’s largest multidisciplinary scientific society and the publisher of the *Science* family of journals (American Association for the Advancement of Science, n.d.b). In 1995, the AAAS established the DoSER program to foster dialogue between scientific and religious communities on issues of science, technology, and society (American Association for the Advancement of Science, n.d.a).

The partnership between the AAAS and the ATS grew out of recognition of both the importance of faith leaders in guiding communities to understand and address scientific topics and the reality that faith leaders may need further training to prepare them for this role.

Formal preparation for the Science for Seminaries project began in 2010 with meetings, symposia, workshops, and surveys to gather information on the needs and interests of seminary faculty, students, and administrators and to conceive of an approach that could help increase the inclusion of scientific content within theological education. This article reports on the first two phases of the project: the Pilot Phase (2014–17) and Phase II (2018–22). As of publication, the Science for Seminaries project continues in various forms in North America and worldwide, but the analysis here is limited to the two phases between 2014 and 2022.

This article seeks to provide a description, analysis, and evaluation of these two phases of the Science for Seminaries project, drawing upon internal evaluation tools, grantee reports, the personal experiences of people involved, and a systematic external evaluation of both phases completed in 2022. First, we provide a description of the project itself, including its major activities, expectations, outputs, and the numbers and types of schools involved. Second, we offer several detailed accounts of project recipients given through reports and internal evaluations. Third, we examine the resource development aspect of the grants, seen through the production of a film series. Fourth and finally, we utilize a comprehensive external evaluation of the project completed in 2022 to offer a wholistic analysis of the Science for Seminaries project, highlighting its biggest strengths and detailing needs that remain unmet in the seminary community.

## **Project Description**

The Science for Seminaries project provided grants to seminaries accredited by the ATS for the purpose of incorporating science engagement into the core curriculum of various ministerial degrees. A key element of the Science for Seminaries project was its emphasis on the incorporation of science engagement into the core coursework of Master of Divinity (MDiv) students. The project particularly focused on MDiv students as this is the primary degree sought by those preparing for religious leadership or other service in congregations. To qualify for the grant, schools must incorporate science content into core courses in at least one of the four main areas of study for MDiv students, which are (as articulated by the ATS) religious heritage, cultural context, personal and spiritual formation, and religious and public leadership (Association of Theological Schools Commission on Accrediting 2020).

Although many seminaries offer elective classes on aspects of science and religion, students who take those courses are self-selected and presumably already have an interest in these areas. Their incorporation into core coursework was intended to ensure all students have the opportunity for exposure to science engagement as part of their theological education. Additionally, incorporating science content into existing courses provides a much lower barrier to entry for faculty compared to designing and teaching an entire course. Modification of core coursework also increases the likelihood of science engagement being sustained beyond the grant period. Seminaries receiving grants were required to incorporate up-to-date scientific engagement into at least two core courses and host at least one public or campus-wide event.

The pilot phase provided three-year grants of between \$90,000 and \$200,000 to ten seminaries. Phase II provided one-and-a-half-year grants of \$75,000 to thirty-two seminaries, broken into four cohorts averaging eight schools each. Toward the end of Phase II, \$15,000 seed grants were also provided to twelve additional seminaries to build capacity for science engagement. Although seed grant recipients were not required to include science engagement in coursework, many did. In sum, fifty-four seminaries received over \$3.2 million in grant funding from Science for Seminaries between 2014 and 2022.

Seminaries received support from the DoSER program throughout the application process and granting period, including FAQ sessions for applicants, personalized advice, and reviews of letters of interest and grant applications. DoSER also provided guidance during the grant in securing science advisors and resources for the projects, ensuring schools received help from respected scientists in their desired fields. These “science advisors” were typically recruited from geographically near institutions to increase the potential for in-person participation and relationship building. In addition, seminaries also received the support of mentors with experience in theological engagement with science. Together, the mentors and science advisors formed a personalized advisory committee for each participating seminary.

Beyond advisors, there were many required and optional meetings throughout the grant. First, DoSER hosted curriculum development meetings for each cohort as well as summer retreats for project leaders and prospective new applicants. These gatherings provided opportunities for grant recipients to form peer-to-peer relationships with other project faculty as well as scientists and other scholars. For all of the Pilot Phase and half of Phase II, these meetings were held in person. After March 2020, the meetings moved to virtual in the face of COVID-related closures. Several in-person meetings were held at the end of Phase II in late 2022. Second, project leaders were also expected to attend the AAAS annual meeting, giving grantees the chance to broaden



their own exposure to and understanding of new and emerging scientific discoveries. At the AAAS annual meeting, DoSER hosted multiple events for grantees to help them process the conference and build community. Third, each grantee seminary was required to hold a curriculum planning meeting at their seminary with all involved parties. DoSER staff attended and helped plan these curriculum and planning meetings.

### **Project Goals**

The many activities of the Science for Seminaries project attempted to fulfill four specific goals, laid out before the beginning of the Pilot Phase in 2014. First, the project aimed to cultivate positive attitudes toward science and enhance science literacy among seminarians, seminary faculty, and the wider seminary community through courses and events. Second, the project aimed to facilitate the development and dissemination of successful models and strategies for dialogue and engagement between science and theology within and across seminary campuses. Third, the project aimed to encourage institutional investment within participating seminaries to sustain and expand initiatives developed with DoSER support. Fourth, the project aimed to establish peer and institutional networks to share knowledge, best practices, and lessons learned.

### **Recruitment and Application**

The application opportunity was advertised through ATS channels, and all ATS-accredited seminaries were invited to apply. Over the course of the project, the AAAS received 175 letters of inquiry from 115 unique seminaries, representing 42% of ATS-accredited seminaries. Eighty-three seminaries were invited to submit full applications, representing 31% of ATS schools. Projects were proposed by seminary faculty who served as project leaders. In total, fifty-four grants were awarded.

Applications were reviewed by an advisory team consisting of subject matter experts, including scientists, theological educators, and others with particular expertise in science-religion engagement. Applications were evaluated on their potential impact, with a particular focus on bringing science engagement to seminaries that had few science components in their curriculum. Applications were also evaluated on the experience and ability of project personnel, the commitment of the seminary as an institution to the goals of the project, and the impact and sustainability of the project beyond the grant period. The final selection of grantees was made by the AAAS and the ATS with input from a dedicated content consultant.

Seminaries applying and selected to receive grants spanned the theological and geographical diversity of the ATS (Tables 1 and 2). Awarded seminaries ranged in enrollment from twenty-eight to 2,498 students (Table 3).

ATS ecclesial family	No. of applications received	No. of grants awarded
Anabaptist	2	1
Evangelical	28	21
Mainline Protestant	30	18
Catholic/Orthodox	20	13
Jewish	1	1

**Table 1:** Science for Seminaries applications received (n=81) and grants awarded (n=54) by ATS ecclesial family.

Geographic region	No. of applications received	No. of grants awarded
US West	12	9
US Midwest	25	18
US Northeast	15	8
US South	22	13
Canada	7	6

**Table 2:** Science for Seminaries applications received (n=81) and grants awarded (n=54) by US Census geographic region.

Enrolled student body size	Number of awarded seminaries
<100 students	9 (16.7%)
100–199 students	18 (33.3%)
200–299 students	13 (24.1%)
300–499 students	7 (13.0%)
500–1500 students	5 (9.3%)
>1500 students	2 (3.7%)

**Table 3:** Number of students enrolled at Science for Seminaries-awarded seminaries (n=54)

### Grantee Activities and Individual Accounts

Granted seminaries often exceeded expectations for activities carried out under the Science for Seminaries grants. Most grantee schools were required to modify two core courses and hold one public or campus-wide event. However, over the course of the project, the fifty-four seminaries modified more than 280 courses and held over 135 campus-wide or public events. Over half of the courses modified were taught by faculty who were not project leaders, indicating a wider interest in science engagement among faculty at granted institutions. In post-grant surveys, 96% of award project leaders said their enhanced courses were still being taught, and 82% said the courses were being taught by the same

faculty (Damond, Sharon, and Slattery 2022, 74). Most schools also exceeded the requirement of one campus event. Even in the face of COVID-related closings and interruptions, seminaries hosted events including lectures, workshops, symposia, and book discussions. These achievements reflect the enthusiasm of seminaries for science engagement as well as the success of this approach for incorporating engagement directly into the curriculum.

Science topics addressed by the seminaries spanned multiple disciplines, with the more common topics including neuroscience, psychology, cosmology/astronomy, biology, and evolution. While guidelines from the funder precluded the inclusion of environmental or biomedical sciences in the core project activities, several schools that modified additional courses addressed these issues in those classes. Some seminaries elected to incorporate a single scientific discipline into multiple classes, while others chose a variety of science topics to engage in. Likewise, the types of courses modified spanned the gamut of the theological curriculum. Theology courses were the most commonly modified (forty-six courses in Phase II), with Bible and scripture courses (25 courses) and counseling, pastoral care, and health courses (20 courses) following (Table 4).

Course area	Number of courses
Theology	46
Bible/scriptures	25
Counseling, pastoral care, and health	20
History	17
Leadership, mission, and ministry	16
Spirituality and spiritual formation	10
Ethics	7
Philosophy	6
Cross-disciplinary courses	15
Other	5

**Table 4:** Number of courses modified by seminaries to incorporate science engagement in Phase II, categorized by course area (n=167).

Seminaries were strongly encouraged to bring the voices of scientists directly into classrooms and events. Scientists served as guest lecturers, participated in symposia and public events, participated in faculty workshops and events, and even invited seminary students into their laboratories.

Many schools pursued further means of science engagement, including establishing centers or institutes to sustain engagement; creating seminars and reading groups on science topics; offering student prizes for writing or preaching about science and faith; giving faculty subgrants to develop latent



science interests and explore new engagement initiatives (such as science activities with local congregations); funding field trips to local science museums and laboratories; and giving financial support to faculty or students to attend science conferences.

### ***A Showcase of Selected Grantees***

While there is not room here for a full description of the activities of all fifty-four seminaries, the following detailed accounts from a selected group showcase grantees' experiences of the grant and illustrate the contextualization of projects to the unique seminaries. In this section, we detail the work of Mundelein Seminary, Hood Theological Seminary, Southeastern Baptist Theological Seminary, and seed grant recipient Garrett-Evangelical Theological Seminary.

Mundelein Seminary of the University of St. Mary of the Lake is a Roman Catholic seminary in Mundelein, Illinois with a total student enrollment of approximately 217. They received a grant from 2018 to 2019, in the first cohort of Phase II of the grant. As a seminary engaged in the training of Roman Catholic priests, Mundelein faced the particular challenge of having a fairly set curriculum. The Science for Seminaries grant allowed them to incorporate science engagement into their existing curriculum as part of a comprehensive initiative in faith–science integration. They chose to incorporate neuroscience and cognitive science into the Fundamental Theology course required for every first-year theology student to help students better understand how the mind receives and processes information and how this relates to religious thought and experience. They also modified their Anthropology, Creation, Grace, and Eschatology course to include engagement with evolutionary science and cosmology. In addition, they brought concepts of science engagement into practice with a seven-week mini course on Discovery: Faith and Science and the modification of their existing Teaching Parish program to provide students the opportunity to lead discussions on science in their local parishes. This last initiative in particular proved to be one of their most effective and allowed seminarians to witness the interest and enthusiasm of many of their parishioners for discussions of science and faith.

Hood Theological Seminary is a historically Black seminary associated with the African Methodist Episcopal Zion Church. They received a grant from 2019 to 2020. Located in Salisbury, North Carolina, Hood has a total student enrollment of approximately 140. The project team at Hood modified their core courses of History of Christianity in the United States and Teaching and Learning in Educational Ministry to incorporate the histories and philosophies of science and neuroscience. Hood also offered two elective courses: Transhumanism and the Imago Dei: The History of the Church and Technology and Science, Faith, and Healing in the History of Christianity and

African Diasporic Religion. Significantly, Hood also used their engagement with the Science for Seminaries program as a launchpad for the International Center of Faith, Science, and History, which holds yearly conferences and other events on the intersection of science and religion (Hood Theological Seminary, n.d.). The center also aired a number of podcast episodes that brought in guest speakers and provided students a platform to discuss science topics important to them and their community. Hood also brought science engagement into their community by sponsoring summer science camps that integrated scientific content and Christian education for underserved children, youth, and adults in Salisbury, North Carolina.

Southeastern Baptist Theological Seminary is a Southern Baptist seminary located in Wake Forest, North Carolina. The largest full grant recipient seminary, it has an enrollment of over 2,100 students. Through their 2019–20 grant project, *Faith Seeking Understanding: Integrating Faith and Science in the 21<sup>st</sup> Century*, they brought science engagement into multiple facets of their theological education curriculum, revising seven courses. Southeastern faculty in theology, counseling, and the Old Testament brought leading-edge science topics in neuroscience and the history and philosophy of science into courses taken by undergraduates and graduate students. Additionally, Southeastern project leadership brought more intentional and intimate science and faith conversations to the broader faculty and PhD students in a monthly colloquium. There, current and future teaching faculty received pedagogical skill training and the opportunity for more open discussions on topics important to that community. Internal activities included mentoring for PhD students as well as book discussion groups. In addition, they hosted four campus-wide evening lectures by scientists and took field trips to the JC Raulston Arboretum, Moorehead planetarium, and a physics lab at North Carolina State University.

Seed grant recipient Garrett-Evangelical Theological Seminary is a United Methodist Seminary of approximately 280 students in Evanston, Illinois. Their 2021–22 project, *Race, Technology, and Healing: Science and Religion in Dialogue*, focused on questions of human identity, trauma, and livelihood, exploring scientific, sociocultural, psychological, and theological ways to understand humanity. They revised their existing required course *Person in Community* to include discussion of human origins and evolution. They also convened a student–faculty book discussion group that explored Ruha Benjamin’s *Race After Technology: Abolitionist Tools for the New Jim Code* and explored the role of technology in exacerbating racial divides. A spring conference entitled *Science Is Not to Save Us: Recentering Our Knowledge Systems in a Relational Cosmos* brought together scientists, faculty, and PhD students to engage a wider audience on impactful topics at the intersection of race, science, and technology.

These few examples illustrate the variety of models and formats for science engagement in theological education institutions. The schools discussed show the diversity and breadth of topics addressed and course contexts these topics were integrated into. They also demonstrate the expansion of the audience beyond faculty and current students in MDiv programs. Projects opened programming and opportunities for enrichment to PhD students, other graduate students, and undergraduates, as well as the wider public.

These seminaries and the other grant recipients provide helpful examples of pedagogical insights and skill building for science engagement and can help faculty and pastors generate ideas for topics and approaches to incorporate science into their own seminaries and communities. The Science for Seminaries website includes profiles of all granted schools along with descriptions of their projects (Science for Seminaries, n.d.). Syllabi from all the participating schools are also available on both the Science for Seminaries website and the DoSER resource website (Dialogue on Science, Ethics, and Religion, n.d), providing a resource for other faculty and institutions who wish to incorporate science engagement into theological education. Course syllabi are tagged with labels including course area, seminary ecclesial background, and science topic to make them easily searchable.

## Resource Development

Hill and Gin (2017, 114–15) identified that video resources, such as short video clips, were the most frequently desired resource by seminary faculty interested in incorporating more science content into their classrooms. Funding for the Science for Seminaries project enabled DoSER to produce several series of short videos for use in seminary classrooms and other venues to spark discussion around scientific advances and other topics at the intersection of science and religion. These films, created through the production company Fourth Line Films, were designed to present scientific topics in an understandable, approachable, and inspiring way, focusing on novel science topics and not theological arguments. They were intended to serve as a jumping-off point from which professors and students could then provide reflection appropriate to their ecclesial approaches and course content.

The first video series, “Science: The Wide Angle,” includes thirteen videos ranging from two- to ten-minutes long, designed to spark discussion of various science topics, including evolution, neuroscience, biology, physics, astronomy, history, and philosophy (Dialogue on Science, Ethics, and Religion 2020). The videos feature seventeen leading scientists and historians of science active in these fields sharing insights about their work. Production for the first series began in 2014 and concluded in 2017.

After the success of the first series, significant funds were allocated in Phase II for a follow-up series broken into three segments. First, an eleven-video series entitled “Who Is Science?” focusing on the personal stories of scientists themselves, offering the opportunity for viewers to see science as a human endeavor rather than a collection of facts (Dialogue on Science, Ethics, and Religion 2022b). Second, a two-video series called “Becoming Human” discussing how humans survived evolution and became the sole remaining hominid species, bringing up many compelling topics for a religious audience (Dialogue on Science, Ethics, and Religion 2022a). Third and finally, a three-video series called “Humans and Race” exploring past and present intersections of science and racism. This series, completed in 2023, featured two short videos and a twenty-seven-minute documentary called “Science as Mastery: A Story about Race and Power” that explores the intersection of race, religion, and science (Dialogue on Science, Ethics, and Religion 2023). “Science as Mastery” premiered at the 2023 AAAS Annual Meeting and has been featured at the annual meetings of the American Association of Biological Anthropologists, the American Scientific Affiliation, and the American Academy of Religion.

Altogether, the videos have been viewed over 150,000 times on YouTube and widely used by grantees, with 86% of project leaders and 53% of other project faculty employing the videos to “some extent” or “a large extent” in courses and events (Damond, Sharon, and Slattery 2022, 47–48).

## **Evaluation and Analysis**

A comprehensive evaluation of the project carried out between 2021 and 2022 analyzed the process, outcomes, and impacts of the project. This mixed methods evaluation used both archival and newly collected data, including surveys and interviews of project applicants (both those that received grants and those that did not), project leaders, other project faculty (nonproject leader faculty from granted schools who taught courses or otherwise led science engagement activities), partner organization staff, science advisors, and students/alumni. In addition, throughout Phase II of the project, all students who attended Science for Seminaries-developed courses were given pre- and post-course surveys, providing measures of impact of the modified courses (Damond, Sharon, and Slattery 2022).

Through this evaluation, six successes were clearly identified: the application process, the ability to cultivate positive attitudes toward science, the connection of seminarians with scientists, the perceived growth of dialogue between science and faith, the support and resources offered, and the sustainability of course and curriculum modifications. The biggest demonstrated lingering need was seen in seminarians’ continued struggle to engage their own parishioners with science.

First, the application and award process was rated highly for clarity and support by both successful and unsuccessful applicants, indicating that the process itself was clear and fair for applicants (Table 5) (Damond, Sharon, and Slattery 2022, 37–38).

<b>How would you rate the clarity of information provided about the grant application? (1=very unclear to 5=very clear)</b>		
	<b>Award project leaders (n=30)</b>	<b>Applicants (n=10)</b>
Application review process and criteria	4.5	4.5
Submission requirements	4.67	4.8
Eligibility criteria	4.83	4.8
<b>Overall, how satisfied are you with the following aspects of the Science for Seminaries award process? (1=very dissatisfied to 5=very satisfied)</b>		
	<b>Award project leaders (n=30)</b>	<b>Applicants (n=10)</b>
Communication with project staff during the proposal development stage	4.68	4.2
Full proposal submission process and requirements	4.46	4
Letters of interest submission process	4.64	4.7

**Table 5:** Assessment of Science for Seminaries application clarity and process.

Second, a major goal of the project was to cultivate positive attitudes toward science. Analysis of pre- and post-course surveys indicates that students’ perceptions of science changed significantly after taking the modified courses.

	<b>Pre-course (n=2,355)</b>	<b>Post-course (n=1,486)</b>	<b>Change</b>
Science is relevant to my current seminary studies	4.03	4.21	<b>+0.18*</b>
My faith community needs to learn more from scientists	4.10	4.25	<b>+0.15*</b>
Science is relevant to my current or future vocation/ ministry	4.13	4.23	<b>+0.10*</b>
My faith community is generally accepting of new scientific ideas	3.67	3.76	<b>+0.09*</b>
Scientists need to learn more from faith communities	4.38	4.47	<b>+0.09*</b>

**Table 6:** Student responses from pre- and post-course surveys. Students were asked to rate their agreement with the statements on a five-point scale (1=strongly disagree and 5=strongly agree).

\* Denotes statistical significance at  $p < 0.05$ .



In particular, students' perceptions of science as relevant to their current seminary studies as well as to their current and future ministry increased. Students' beliefs that their faith communities need to learn more from scientists also increased (Table 6) (Damond, Sharon, and Slattery 2022, 55).

Third, 72% of students/alumni interviewed stated that they interacted with a scientist during their time at seminary, most often as a guest lecturer in class. They described these interactions as “invaluable,” stating that they “gave me a different perspective” and “strengthened and reinforce[d] the formation process” (Damond, Sharon, and Slattery 2022, 52). Faculty also reported very high satisfaction with their interactions with scientists. Overall, 90% of project leaders surveyed indicated that they were “very satisfied” (86%) or “satisfied” (4%) with the support they received from their science advisors. Other project faculty reported less interaction with science advisors but were still “very satisfied” (48%) or “satisfied” (33%) with their support. Eight out of ten project leaders interviewed reported continuing their relationship with at least one of their science advisors after the grant period ended (Damond, Sharon, and Slattery 2022, 49–50).

Fourth, both project leaders and other project faculty reported the grant having a strong positive impact on their engagement with science and faith. In particular, they observed “positive” or “very positive” impacts on the amount of dialogue between science and faith communities in their contexts, the level of interest in science-related topics among seminary students, and the preparation of seminary students to navigate stress points in difficult conversations about science (Table 7) (Damond, Sharon, and Slattery 2022, 67). While these results might be biased in favor of confident project leaders, the overwhelming positivity of project faculty and project leaders points to strong positive impacts across many campus communities.

	Award project leaders (n=30)	Other Project Faculty (n=21)
The amount of dialogue between science and faith communities	100%	95%
The level of interest in science-related topics among seminary students	100%	95%
Preparation of seminary students to navigate stress points in difficult conversations about science	96%	95%
The extent of collaboration between scientists and theologians	89%	86%
The ability of faculty in your school to effectively navigate stress points in difficult conversation about science and faith	89%	86%
The amount of collaboration among scholars from different faith traditions	56%	76%

**Table 7:** Project leaders and other project faculty who indicated the Science for Seminaries grant had a “positive” or “very positive” impact on the following engagement factors.

Fifth, ongoing support for and resourcing of seminaries were also important factors in the success of the program. Faculty reported that they were “satisfied” to “very satisfied” with the responsiveness of project staff (82%), the dissemination of information and resources (78%), and the facilitation of access to science advisors (76%) (Damond, Sharon, and Slattery 2022, 45–46). Previously mentioned curriculum meetings and retreats provided opportunities for project leaders to learn from one another and share successes, challenges, and wisdom with other faculty across denominational lines and from other ecclesial families. Attendees particularly reported that the AAAS annual meeting, summer faculty enrichment retreat, and AAAS curriculum meetings improved their knowledge about science (78–86%) and broadened their scholarly network (67–71%). The opportunity to network with both peers and scientific and theological experts through these events was consistently identified by interviewees as an important factor in the success of schools implementing Science for Seminaries projects (Damond, Sharon, and Slattery 2022, 50–51).

Sixth and finally, another important measure of the success of the project was the sustainability of the changes made as a result of the grant. To this point, 96% of project leaders reported in 2021 and 2022 that their revised courses were still being taught as modified, sometimes up to five years after originally taught. Beyond this, 100% of project leaders surveyed stated that there was continued interest within their school to engage with science in the future, and 26% reported that the grant led to additional funding for integrating science into theological education (Damond, Sharon, and Slattery 2022, 74–75).

While many positive aspects of the project were identified, the Science for Seminaries team was eager to understand the places where the project could be improved. In this vein, the biggest shortcoming identified in the evaluation was the confidence and comfort levels of seminarians when discussing scientific topics with parishioners. As shown in Table 6, students recognized the relevance of science to their ministry and felt their faith community would be receptive to new scientific ideas. As well, 44% of students and alumni surveyed reported discussing science-related topics within their faith communities at least once a week. However, only 14% indicated that they initiate most of these conversations, with 58% saying they equally initiate conversations and respond to congregants’ questions and 28% saying they mostly respond to questions. This, along with the fact that 56% reported having science-related discussions once a month or less, may indicate that students do not feel prepared to proactively engage with science in their ministry context. In interviews, students and alumni expressed some hesitancy about facilitating complex and/or controversial discussions about science and religion (Damond, Sharon, and Slattery 2022, 68–69).

Overall, the evaluation demonstrated the clear success of the Science for Seminaries project in meeting, and in many cases exceeding, its goals. It also

gave insight into some of the most effective approaches for engagement and avenues for future development.

## Conclusions

The Science for Seminaries project has demonstrated the success of incorporating science engagement into theological education as a way to prepare faith leaders for the challenges of a rapidly changing world. By bringing science into core required coursework, this project provided the opportunity to expose even those students who may be hesitant or mistrustful of science to science engagement in a way that may be more easily accepted and understood. The ability of project leaders to contextualize their engagement to the needs and interests of their students also helped to overcome preconceived notions of how science may relate to theological engagement and ministry.

Both the evaluation and the experiences of project participants indicate that the targeted approach of relating specific scientific issues to particular areas of theological reflection or engagement seems to be more effective than generalized engagement that seeks to examine the relationship between science and religion on a more philosophical or theoretical scale. This approach, coupled with a commitment to personal relationships with scientists and science spaces, was among the key ingredients in the long-term success of the grant.

As identified in the evaluation, there may still be a disconnect between the perceptions and attitudes of seminary graduates towards science and their comfort engaging with science in the context of their own ministry. Future projects of this type may benefit from more intentionally addressing practical ways future faith leaders can proactively bring science engagement into their ministry contexts.

Nevertheless, it is clear that the Science for Seminaries project has reaped many rewards and seen many successes since its development began in 2010 and the kickoff of the Pilot Phase in 2014. As a small token of this success, Phase II of the Science for Seminaries project was recognized with an 2020–21 Expanded Reason Award for teaching, given annually by the Joseph Ratzinger-Benedict XVI Foundation for the most impactful projects that engage science, philosophy, and religion (Expanded Reason Institute, n.d.).

A further, more significant measure of success is that the Science for Seminaries model has spawned additional ongoing projects, including a similar Science for Seminaries grant program in the UK run by Equipping Christian Leadership in an Age of Science, which is now expanding to other countries (Equipping Christian Leadership in an Age of Science, n.d.). In addition, DoSER has adapted this model of grant-making to seminaries for a new project focusing on climate change, *Climate Science in Theological Education* (Sloane-Barrett 2023).

Given the fast-paced nature of scientific and technological discovery, faith communities will need to continue to adapt in order to address science and technology in a changing world, and engagement with science will be essential for faith leaders who wish to provide relevant and meaningful guidance to their communities. In the face of such challenges, seminaries will continue to need proactive, regular engagement with science, scientists, and science communicators to help future religious leaders properly engage with the issues of today and tomorrow. Funding will remain a struggle, and projects like this take significant funds to see the kind of success reported here. We are hopeful that funding agencies will continue to support projects such as this for years to come.

Finally, the four authors of this article led the project at different times and in different capacities on behalf of the AAAS DoSER, but we are just four of many who contributed to the success of Science for Seminaries. We are grateful for all, including readers of this article, who have contributed in small or large ways to the success of the project over the years.

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