Engaging Science in Seminaries: A View from Faculty

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ABSTRACT: This article reports findings from a survey of faculty science engagement at Protestant ATS member institutions. On average, faculty report moderate-to-high engagement in scientific topics in both the classroom and research. While the social and behavioral sciences were most frequently referenced by faculty, the life sciences and cosmology saw the highest levels of engagement within the natural sciences. Theological tradition of the institution and faculty member were unrelated to science engagement. Finally, faculty expressed concern with seminary student preparation in the sciences and offered suggestions for improving scientific engagement within their institutions.

A re seminary graduates adequately prepared to engage our modern, scientific culture in their various ministries? What are they learning during their years in seminary about how faith and science intersect? To what extent are faculty engaged in scientific topics in their teaching and research? Are seminaries providing support for faculty and students who are interested in pursuing scientific topics? In fall 2015, The Association of Theological Schools (ATS) was the recipient of a research grant from the John Templeton Foundation to study science engagement in North American Protestant seminaries. As part of this project, ATS fielded a survey of faculty at member institutions. The survey provides a baseline report of faculty perceptions about the extent of science engagement in the classroom, pedagogical resources, student interest in scientific topics, potential controversies at the intersection of faith and science, science and faculty scholarship, and institutional support for pursuing scientific topics.

This brief report provides a summary overview of findings from this survey. We begin with a brief description of the data, followed by a summary of the extent and nature of science engagement in the classroom, move to a section on student interest and preparation, and conclude with the professional and personal engagement of seminary faculty.

Data and methods

The survey described in this report is part of a larger project designed to generate a baseline understanding of how science is currently engaged in North American Protestant seminaries. In addition to the survey, researchers at ATS have scheduled interviews with key informants from 30 selected Protestant member institutions as well as a document collection and content analysis from the same set of institutions.

The survey itself was designed in fall 2015 and administered in January 2016. A random subset of faculty from all Protestant member institutions was selected for participation. Faculty from Canadian schools and racial/ ethnic¹ faculty were oversampled to ensure adequate numbers in each category. The final response set included 739 faculty from 186 institutions, with a response rate of 32 percent.

The final response set included 28 percent women (slightly over-representing the ATS faculty population) and a racial/ethnic breakdown of 67 percent those of Anglo descent, 14 percent of Asian descent, 12 percent of African descent, 5 percent of Latino descent, and 1 percent of Native descent. Faculty of Asian and African descent were over-represented in the set. Fifteen percent of the final sample (an over-representation) were faculty from Canadian schools; 40



¹ The ATS Committee on Race and Ethnicity has determined that the designation "racial/ethnic" is most appropriate for use at this time in theological education. See Footnote 35 on page 38 in this issue.

percent of the final sample (a slight over-representation) were from embedded schools; and 59 percent of the final sample of faculty from Protestant schools (a near representation) were from evangelical schools.

All analyses throughout this report account for the "nested" structure of the data (faculty nested within seminaries) to provide the most accurate estimate of the overall beliefs and practices of faculty at Protestant institutions. Most graphs show post-estimations from statistical regressions that accurately adjust for this nested structure (e.g., random-effects models).

Classroom engagement

Perhaps the most important area to begin with is the classroom. Toward the beginning of the survey, faculty were asked to gauge how often, if ever, they taught or discussed science or science-related information in the classroom with students (Figure 1). Very few faculty reported they "never" address these issues (7 percent), while about 1 in 7 (14 percent) say they address these issues "frequently." Most faculty are somewhere between these two, with the most popular response category being "occasionally" (37 percent). On a scale from 1 ("Not at all") to 5 ("Frequently"), the mean value is near the middle at 3.21.

This varies, however, by a number of factors. Figure 2 shows how this measure of classroom engagement breaks down by faculty area of expertise (faculty were able to select more than one area). At the top are



Figure 2. Classroom science engagement by area of faculty expertise (all faculty)

Source: Engaging Science in Seminaries Survey, 2016

ethics, religious studies, and pastoral care, all with a score of 3.5 or above on classroom science engagement. At the bottom are preaching, Biblical languages, and New Testament, with scores of 2.8 or below. Although it isn't entirely clear why these differences exist, it does appear that classroom science engagement is associated with areas that are applied or interdisciplinary in nature, while the areas scoring lower are more "pure," with clear disciplinary boundaries.

Theological identity seems to matter little (Figure 3). Faculty who reported that the label "evangelical" identifies them "very well" are essentially no different from those who strongly identify with the label of mainline Protestant. Likewise, those who claim they are theologically conservative are no different from those who are theologically progressive. Science in the classroom seems equally important (or unimportant) for those who differ in their theology. Both gender and race seem to matter little as well. Males and females both are near the mean with a score of 3.2. Likewise, responses for whites and nonwhites are nearly alike (3.2 for whites and 3.1 for nonwhites).²

On the other hand, position on origins *does* seem to matter. While both Old Earth creationists and theistic evolutionists rate above average in their frequencies of engagement with science in the classroom (3.4 and 3.6,



Figure 3. Classroom science engagement by faculty characteristics

More fine-grained analyses of racial and ethnic categories also found no statis-2. tically significant differences between categories. Differences between whites and non-whites are shown throughout the report to conserve space.

respectively), Young Earth creationists score substantially lower than the average (2.7). It should be noted that only 5 percent of faculty say that the latter category describes them "very well." Additional analysis suggests these differences between positions on origins are not due to differences in areas of expertise, science training, or general theological orientation. Once these are controlled for, the gap between Young Earth creationists and others is virtually unchanged. This suggests that there is something related to holding this position that results in a lower likelihood of engaging in scientific topics in the seminary classroom.

Lastly, we can see, at the bottom of Figure 3, that faculty who reported having some type of graduate training in science (about 15 percent of all seminary faculty) are considerably more likely to address science in the classroom. What sort of scientific training do these faculty members have? Faculty members who reported having science training were invited to write in the degree or area of science. The training was overwhelmingly in the social and behavioral sciences (73 percent). Psychology, sociology, and anthropology were frequently mentioned by seminary faculty. About 21 percent reported that they had training in one of the natural sciences. The remaining (10 percent)³ had training in mathematics or engineering.





Source: Engaging Science in Seminaries Survey, 2016

Percentage points do not add up to 100 because a few faculty members reported 3. having training in more than one field.

We also assessed if there were general differences by seminary characteristics. Figure 4 presents the results. In short, the institutional characteristics we measured had little impact on the average rates of classroom science engagement. This includes where the seminary is located (United States or Canada), whether it is freestanding or embedded in a college or university, whether the institution can be classified as mainline Protestant or evangelical Protestant, and the gender and racial distribution of students and faculty.⁴ One factor that appeared, initially, to be important, was the size of student enrollment. Larger seminaries, on average, seemed to report more engagement with science in the classroom. Upon closer inspection, it was not the size of the seminary that was driving this relationship, but the number of degrees offered. Once this was included, the size of the seminary no longer had an independent effect. Figure 5 shows the relationship between the number of degrees offered and the score on the classroom science engagement measure. Seminaries with 15 or more degrees (about 8 percent of seminaries) have faculty who report scoring about 3.5 on the engagement measure. Seminaries with three or fewer degrees (a little less than a quarter of seminaries) average scoring around 3 or below.





Source: Engaging Science in Seminaries Survey, 2016

Seminaries ranked as "high" scored in the top quintile on the measure of gender 4 or race, while seminaries ranked as "low" scored in the bottom quintile on the same measures.

It is not initially clear as to *why* seminaries with more programs score higher on scientific engagement in the classroom. One possible reason might be that larger seminaries with more degree programs have a higher proportion of classes devoted to areas such as ethics and religious studies, which Figure 2 suggests is associated with scientific engagement in the classroom. But this turns out not to be the case. When the teaching area of expertise is controlled for, the basic association between number of degrees and science engagement remains virtually unchanged. Other factors, such as the religious and scientific beliefs of the faculty, are also not the reason for the difference. More investigation is clearly needed.

While we know how frequently faculty report engaging science in the classroom, this does not tell us *what* scientific topics or fields are being addressed. Faculty who reported addressing scientific topics at least "rarely" were asked precisely this. Figure 6 presents the results. (They





were eligible to select more than one.) Of those who included some sort of scientific topic in the classroom, the social sciences (sociology and anthropology) came in on top, with 73 percent of faculty including these topics. Psychology (behavioral science) was next, with 56 percent. Perhaps it is not surprising that these are so frequently used, given the importance of these disciplines to aspects of biblical and religious studies as well as pastoral care. The next most common disciplines are the life sciences (biology, genetics) and cosmology (astronomy, astrophysics), at 45 and 38 percent

respectively. These fields have clear relevance to theological issues of creation and are likely addressed within these contexts. Fields such as medical science and engineering/technology are the least likely to be addressed in the seminary classroom.

If faculty reported engaging a particular scientific subject in the classroom, they were also asked to report how prepared they felt to teach in this area. These results are presented in Figure 7. In short, this follows a very similar pattern to Figure 6, with one exception: engineering and technology. This means that not only are topics like earth science and medical science rarely brought up in the classroom; faculty also feel less prepared to teach on these topics when they do arise. Likewise, the most commonly taught topics in the social and behavioral sciences are also the ones that faculty report feeling most competent about in the classroom.



Figure 7. Preparation to teach scientific subjects

Source: Engaging Science in Seminaries Survey, 2016

We also asked faculty whether they would like to devote more time, would like to devote less time, or were comfortable with the amount of time spent addressing scientific issues in the classroom. The majority of faculty reported that they are happy with the amount of time they spend (69 percent), while most of the remainder wish they could devote more time to these topics (27 percent). Only 3 percent would like to spend less time on these topics.

The 27 percent of faculty who reported wanting to devote more time to scientific issues were of particular interest to us. If they wanted to do this, what was stopping them? We provided a number of possibilities, and faculty who wanted to teach more science were able to indicate which ones were reasons and which ones were not. These are presented in Figure 8.



Source: Engaging Science in Seminaries Survey, 2016

The most popular answer was that there is simply not enough time, with a little more than half indicating this as a factor. Nearly this many (47 percent) also indicated that they do not think they are knowledgeable enough about scientific topics to include them. Very little of the reason is due to a fear of the consequences of incorporating more science. Only around 4 percent of these faculty indicated that they don't do this because their views on the scientific topics would be unwelcome or because they are concerned about how scientific issues might impact the faith of students.

Who wants to spend more time on scientific topics? If we separate out faculty by teaching area (Figure 9), we see that this follows closely to what we uncovered in Figure 2. Ethics and religious studies are near the top, with 37 and 36 percent wishing they could spend more time in the classroom on scientific topics. This means that faculty who are already spending more time in the classroom on these topics are the very same ones who think these topics are not addressed enough. There is one exception. Only 15 percent of faculty who teach about pastoral care issues want more time devoted to scientific issues, despite reporting higher-than-average levels of classroom science engagement (3.5 on the 5-point scale). Faculty teaching in this area use psychology in the classroom more than any other



Figure 9. Percent wanting to spend more time on scientific issues in classroom by area of expertise (all faculty)

group (85 percent). Perhaps they believe the behavioral sciences are already adequately integrated into their fields of study.

Looking at the set of faculty characteristics, we can see additional factors are important in predicting which faculty want more science (Figure 10). Theological orientation makes some difference, with evangelicals and theological conservatives slightly less likely to want more time devoted to scientific topics (about 1 in 4) compared to mainline Protestants or theological progressives (about 1 in 3). The larger difference occurs



Figure 10. Percent wanting to spend more time on scientific issues in classroom by faculty characteristics (all faculty)

Source: Engaging Science in Seminaries Survey, 2016

between those who adopt an evolutionist position of creation and those who reject such a position. Those who strongly identify as either Young Earth or Old Earth creationists are less than half as likely to desire additional time devoted to scientific topics (18 percent) compared to faculty who strongly identify as theistic evolutionists (38 percent). Lastly, and somewhat surprisingly, those with graduate training in science are less likely to want to devote classroom time to science integration. Perhaps, given their backgrounds, they feel that they already do a good job in this area.

The survey included a set of questions about pedagogical method, preparation, and interest in teaching resources. Among faculty who reported engaging science in the classroom (i.e., excluding those who reported that they "never" addressed scientific topics), Figure 11 presents the preferred pedagogical method that faculty use. Unsurprisingly, discussions, lectures, and assigned readings are the most commonly used methods, with about three out of four faculty reporting that this is what they use. Written assignments and film/video clips are both used by about half of faculty, while guest lecturers and field trips are less commonly used (26 percent and 14 percent, respectively).⁵





Source: Engaging Science in Seminaries Survey, 2016

Each of these pedagogical methods can also be broken down by the scientific dis-5. cipline addressed in the classroom, although that would be cumbersome to include in a report such as this.



Figure 12. Resources consulted for classroom science material (all faculty who report using science in classroom)

Source: Engaging Science in Seminaries Survey, 2016

What resources do faculty consult when preparing to address science material in the classroom (Figure 12)? Nearly all report relying on books (88 percent), followed closely by journals (76 percent). The Internet is also a useful resource for many (65 percent). Other resources, such as film/ television, magazines, and radio, are less popular. This does not mean, however, that faculty are uninterested in resources like films. They are, but for a different purpose.



Figure 13. Interest in resources for classroom use on scientific topics (all faculty)

Source: Engaging Science in Seminaries Survey, 2016

In a separate question, faculty were asked to assess how interested they would be in certain types of resources for classroom use (Figure 13). For this purpose, short video clips (two to three minutes long) topped the list. On the whole, faculty are most interested in flexible pedagogical tools such as short readings, videos, or interactive websites, and less interested in full-length books and fully designed curricula.

Summing up, we can see several important patterns emerge in the data on science in the seminary classroom. First, the vast majority of seminary faculty believe that science is being engaged in their classrooms. Only 7 percent say it is never addressed.

Second, faculty in fields that are more applied or interdisciplinary are more likely to report classroom science engagement (e.g., ethics and religious studies), while established, self-contained areas of study such as Old and New Testament or biblical languages are less likely to report engaging with scientific issues in the classroom.

Third, for many faculty—especially those with expertise in areas like pastoral care—scientific engagement relies heavily on the social and behavioral sciences (sociology, anthropology, and psychology) and very little on fields like physics, earth science, medical science, or engineering. Areas of science that deal with issues related to creation, such as the life sciences and cosmology, fall somewhere between these.

Fourth, a little more than a quarter of seminary faculty would like to spend more time covering scientific topics. (Nearly all the remaining faculty are happy with the amount of time spent.) The reasons they do not spend more time are primarily related to a lack of time to prepare and lack of knowledge. Notably, their reasons are not due to any fear that their own views are unwelcome or that student faith might be negatively impacted.

Fifth, the most important factors that predict classroom science engagement and the desire to spend more time on science are their position on creation and origins and their graduate level training in science. Theistic evolutionists are the most likely to engage with science and want more of it, while Young Earth creationists are the least likely. Those with graduate training in science are more likely to include it in the classroom but less likely to think more of it is needed. Other factors such as general theological orientation of the faculty or seminary, gender, and race or ethnicity tend to be unimportant.

Sixth, seminaries that offer more programs have higher overall rates of classroom science engagement, but this is not because they have more faculty teaching in certain areas, or because they have more or less faculty with particular science or faith views.

Finally, seminary faculty tend to use conventional pedagogical methods such as discussion, lecture, and readings to engage science, although they express interest in new classroom tools such as short video clips and interactive websites to help supplement classroom learning.

Student engagement

A number of survey items asked faculty to rate their overall impressions of student science background, interest, and preparation.⁶ First, faculty were asked to approximate the proportion of students who come to their seminaries with a degree in the natural or social sciences. Faculty were also able to mark that they were unable to make this estimate. (A little over one-third indicated this.) The average estimate of students with a natural science degree is 15 percent (10 percent at the median); with a social science degree, 28 percent (25 percent at the median); and without any science degree, 59 percent (60 percent at the median). Just as faculty are more likely to have graduate training in the social sciences, faculty perceive that students are more likely to come in with backgrounds in the social sciences than in the natural sciences.

Are students interested in scientific topics? Most students are, according to 71 percent of faculty who taught on scientific topics in the classroom, but not more or less interested than in other topics. Eleven percent reported that students were *less* interested in science than in other topics, while 18 percent of faculty reported that their students were *more* interested in these topics than in other topics. This differs by faculty area of expertise in predictable ways (similar to what was found in Figure 2). For example, faculty whose expertise is an area like pastoral care report 25 percent of students being *more* interested in scientific topics than other topics. The same measure is less than 10 percent for those whose expertise is Old Testament.

This perceived lack of student interest by faculty teaching Old Testament is interesting in light of where faculty perceive controversy among

^{6.} It is important to remember that these are *faculty* reports of their perceptions of students. While the ideal would be to have student self-reports, these items should still provide a rough approximation of the characteristics of students.

students. When asked whether any scientific topics provoked controversy among the students, 61 percent of faculty reported "yes." When these 61 percent of faculty were asked what the controversy was about in an open-ended survey item, nearly half of the responses (48 percent) had to do with issues of creation and evolution (see Figure 14). In fact, no other



Source: Engaging Science in Seminaries Survey, 2016

single issue was raised more than 20 percent of the time (several faculty mentioned more than one issue). Outside of the centrality of the issue of origins, the list provided by faculty proved to be diverse. Issues related to how to incorporate psychological or social scientific studies into various theological fields occurred frequently. Gender/sexuality and biomedical issues were also frequently raised as potentially controversial topics.

Lastly, how prepared are students to deal with scientific topics in

their future ministries? Only 21 percent of faculty agree that their students are "well prepared" to address science. The remainder are split nearly evenly between

66 Only 21 percent of faculty agree that their students are 'well prepared' to address science.

faculty who "neither agree nor disagree" (39 percent) and those who disagree with the statement (40 percent). By most accounts, faculty are not optimistic in how their graduates will fare in this area. Moreover, there are almost no variables in the dataset that clearly differentiate faculty opinion on this. Seminary differences in size, number of programs, gender and racial composition of the faculty, gender and racial composition of the students, or ecclesial family (evangelical versus mainline) make little difference here, nor does the area of expertise of the faculty, individual faculty demographic characteristics, faith identity of the faculty, or position on human origins. The only factor that is significantly associated with believing that students are prepared is the level of scientific training the faculty member has received. Faculty who receive more training are more confident that students are ready to engage in science in their ministries. (Of faculty with graduate-level training in a scientific field, 32 percent believe students are prepared).

Consequently, using faculty estimates, we can say that most students do not come to seminary with scientific training, but if they do, they are nearly twice as likely to come with social scientific training compared to training in one of the natural sciences. Most faculty (7 out of 10) also believe that students are interested in scientific topics, but no more so than in other topics that might be covered in class. Despite this, a majority of faculty report that there is some controversy surrounding scientific topics, with the most dominant concern regarding the issue of creation and evolution. Although this issue is clearly the most common, there are numerous other points of contention at the intersection of science and theology. Finally, only one in five faculty members believe that their seminary students are "well prepared" to engage with science in their various ministries.

Professional and personal engagement

The third area this study investigated was the degree to which science fit into the professional and personal lives of seminary faculty. Faculty were asked whether they incorporated any scientific fields into their scholarly activities. The results, presented in Figure 15, are somewhat predictable by now. The social and behavioral sciences are at the top. (Nearly 4 out of 10 faculty report using a social science like sociology or anthropology, while 3 out of 10 report using psychology.) At the bottom are the medical sciences and engineering/technology (8 percent and 4 percent, respectively). This reinforces the taxonomy we have seen in terms of classroom science engagement. Fully 44 percent of all faculty do not incorporate *any* of the sciences into their scholarship.



Figure 15. Scientific field used in faculty scholarship (all faculty)

Personal interest in scientific fields follows a similar pattern (Figure 16). Not only are the social and behavioral sciences most likely to be used in scholarship and most likely to be addressed in the classroom, but faculty also say they find these fields personally most interesting to them (e.g., about two-thirds say they are personally interested in social science). The rest of the scientific fields follow a similar pattern, with medical sciences and engineering/technology holding little personal interest for seminary faculty.



Figure 16. Personal interest in various scientific fields (all faculty)

Source: Engaging Science in Seminaries Survey, 2016

Regarding their own reading patterns, faculty clearly expressed an interest in scientific topics. Nearly half (46 percent) reported reading a popular scientific magazine in the past month, while about half this number reported reading a peer-reviewed scientific journal (23 percent). Nearly all faculty claimed they would read an article about a new scientific discovery if they saw a headline. Only 6 percent told us that it is unlikely they would read such an article.

For the faculty who do incorporate science into their scholarship, how central is the science to their research and publications? Only 20 percent of this group (11 percent of all faculty) consider science to be central to their scholarship. For the vast majority of this group, science is one aspect among many (70 percent)—not central, but neither at the periphery. Only 10 percent who rely on science assign a clear minor or subordinate role to it in their scholarship.

A number of measures included in the study try to tap into the general sense of support and interest in the seminary as a whole. The results should be encouraging for those wanting to see more science engagement at Protestant seminaries. Only about 19 percent of faculty view their colleagues as uninterested in the intersection of science and religion. More than half clearly see interest in these issues by their colleagues. Likewise, the vast bulk of faculty feel institutional support for addressing scientific issues in both their teaching and scholarship. Nearly three out of four (74 percent) agree that teaching that addresses scientific issues is supported. Seventy-one percent agree with a similar statement about scholarship (only 4 percent and 7 percent, respectively, *disagree* with these statements).

Nevertheless, within this general context of interest and support, slightly more than half of the faculty indicated that the seminary could be doing more to engage scientific issues (52 percent). These faculty were asked to write in what they think their institutions should be doing to achieve this. The results were coded and are presented in Figure 17 (responses could fall into more than one category). No single suggestion dominates.

The most common response involves some sort of change to classes or curriculum (a little more than a quarter suggested this). A number of respondents suggested adding particular classes, incorporating more scientific issues into existing classes, or changing curricular requirements to ensure that more students take classes that deal with science. Nineteen percent of faculty named very specific issues that they would like to see



Figure 17. Faculty suggestios for further science engagement at their institutions (faculty who believe seminary could be doing more to improve science engagement)

Source: Engaging Science in Seminaries Survey, 2016

better addressed or advocated for at their institutions. These vary substantially from environmental issues to sexuality. Somewhat surprisingly, very few faculty members directly mentioned issues of human origins or evolution when they advocated for specific issues. Perhaps the advocates would hope to expand the science and faith conversation beyond this. A number of faculty suggested cross-disciplinary projects (especially with scientists), and a number indicated that lecture series, conferences, forums, or colloquia would be useful to help better engage science. If we move down to the bottom of the list, we can see that a few faculty suggested making special hires in this area, and a (very) few faculty suggested the need for new resources such as pamphlets or films.

Conclusion

It is clear that most Protestants seminaries have faculty who vary in their engagements with scientific topics, but a majority show moderate to high interest. Moreover, most faculty feel support from their institutions to explore these issues in the classroom and in their research. In terms of current engagement, it is clear that many faculty are at ease with the social and behavioral sciences. These dominate in both the classroom and scholarship. When it comes to the natural sciences, the life sciences and cosmology are most frequently addressed (likely because of theological issues related to creation). Likewise, faculty recognize that issues of creation and evolution dominate controversies at the intersection of faith and science for many students. While the medical sciences and engineering are important to small groups of faculty, they are not widely engaged as a part of theological education at Protestant seminaries.

It is also important to reiterate what this report did not find. Science engagement is not an issue of theological tradition. There is no evangelical nor mainline divide over science engagement (whether at the seminary level or the faculty level), nor is science something that male faculty engage at higher levels. Racial differences likewise do not impact engagement. At the institutional level, the only consistent factor associated with higher engagement is the overall number of degrees offered, with more degrees associated with more engagement (especially in the classroom). For faculty, those with science training and those who adopt a theistic evolutionist position on origins are consistently more likely to engage science in the classroom and in scholarship.

Finally, although science engagement is occurring at a number of levels, faculty expressed concerns when it comes to student preparation to deal with science in their future ministries. Only 20 percent believe their students are "well prepared" for this. Likewise, a majority of faculty have suggestions for their institutions to further improve engagement with science, the most common involving changing courses and curriculum.

Overall, these findings should encourage those who desire to see more and better science engagement in Protestant North American seminaries. While most faculty recognize there is much more that could be done in this area, they also report being personally motivated and supported to undertake the challenge.

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