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A PROPOSED CURRICULUM TO IMPROVE THE SCIENTIFIC LITERACY OF PASTORAL LEADERSHIP IN THE CHURCH

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by

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DEDICATION

This thesis is dedicated to everyone in my life who has taken the time to answer my questions.

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Abstract

Scientific illiteracy is a widespread reality in the Christian church today. The observatory and evidentiary nature of science seems to strongly contradict the faith-based belief in religion that often lacks physical evidence. This contradiction has incited many different conflicts between the congregation of the church and proponents of scientific advancement. A potential cause of this division is that the current education provided for church leaders is severely lacking in exposure to scientific topics that would allow these leaders to effectively communicate with their congregation when scientific issues are raised. Therefore, this research proposes a supplementary curriculum in the form of a certificate program for undergraduate students pursuing leadership in church ministry that would improve their scientific understanding as well as their ability to confidently analyze scientific controversy while preserving a biblical stance. This curriculum was developed based on the opinions and responses of current church leadership across the country in order to be relevant, useful, and practical to implement. A survey was used to gain these insights and the main findings were that current leadership do believe that the church needs to improve its scientific literacy and is currently doing a poor job at reconciling scientific evidence with Christian beliefs. They also maintain that science and Christianity are able to be totally compatible, showing that this additional education would be effective and beneficial. The goal of this research is to begin to help bridge the gap between science and the church, ultimately increasing the church's relevance in a modern, scientific world.

KEY WORDS: scientific literacy, ministry, church, leadership, education

TABLE OF CONTENTS

INTRODUCTION

Scientific illiteracy is unfortunately a widespread reality in the church today. Growing up in the church, while also being interested in a career in science, I experienced first-hand the growing dissension between religious organizations and scientific advancement, mostly stemming from a lack of understanding on both sides. For instance, many religious people view science as a means for debunking the existence of God while people in science may see religion as a purely subjective experience that often requires people to abandon logic.

As a young member of the church, whenever I had questions about evolution, mental health, or other topics with a scientific basis, there was notable lack of qualified individuals that could knowledgably answer my question or that knew how to thoroughly investigate such topics. The answers that I received were along the lines of general wisdom to continue to trust in the Lord, which is perfectly adequate church advice but did little to help guide me towards a logical conclusion that upheld scientific evidence as well as my Christian worldview. Our God is both logical and supernatural, and I believe that we could be more effective and unified as a church in this scientific world if we were able to critically examine scientific questions as they are raised rather than dismissing them.

The current education that leaders in the church undergo is severely lacking in exposure to scientific topics that would allow these leaders to effectively communicate with their congregation when scientific issues are raised. Consequently, numerous leaders in the church are ill-equipped at knowing how to investigate scientific evidence that questions the Christian faith as they are hardly exposed to these topics. Despite the rising scientific advancement of the world, this integrative education is still absent from many ministry degrees.

Not only do these scientific questions, when left unanswered, perpetuate the disparity between religion and science but they also promote unnecessary doubt within the church that may damage the faith of believers. This lack of scientific knowledge within the church is arguably a major contributing factor in the markedly low church attendance of college students as they are being exposed to new ideas that they cannot reconcile with their faith.

Increasing scientific literacy in the church will help bridge a significant gap between the church and society. It provides an opportunity for the church to embrace the scientific advancements of the world and, therefore, grants it a greater influence. As Christians, we are ultimately called to share the good news with others and being able to resolve scientific evidence with our faith and use it as a tool for seeing God's glory will only aid in that mission. Additionally, within the church, leadership will be more effective at leading congregations to critically investigate matters that often incite doubt in the minds of believers, such as life's origins, mental health, or a myriad of other bioethical issues that have become increasingly relevant. Overall, the faith of the church will be strengthened, both as a community and individually, by learning more about God's character through His creation. The goal for creating an integrative curriculum is to help future leadership in the church gain a deeper understanding of science, leading to a more knowledgeable church with a greater influence in an increasingly scientific community.

A possible curriculum will be proposed in this study based on responses from those currently in positions of church leadership. Ultimately, this study strives to answer the following questions:

How can the scientific literacy of church leadership be improved through education?

What specific scientific topics do professors/leaders in ministry need to understand?

REVIEW OF LITERATURE

Introduction

Since the advancement of science in our world, there has been a clear disparity between scientific claims and religious ideas. The observatory and evidentiary nature of science seems to strongly contradict the faith-based belief in higher powers that often lack physical evidence. This contradiction has incited many different conflicts within students who have grown up in the church, sheltered from the major scientific claims that they encounter as fact in higher education. Their leadership until that point, whether in the form of parents, pastors, or ministers are largely unable to address this conflict within students due to their entrenchment in the church's teachings and lack of scientific education. The dichotomy between science and religion is then perpetuated, leading to unnecessary polarization that could be remedied by increased understanding.

Recent consequences of this polarization and lack of scientific literacy can be seen in the COVID-19 pandemic where mask mandates and vaccination have become contentious topics among churches. Misinformation and confusion surrounding these medical recommendations have resulted in a heated debate, a lack of trust in medical professionals, and therefore, people that are potentially making unhealthy decisions. This may have been largely avoided if more church leadership possessed the capability to understand and relay some of the scientific backing behind the precautions. The pandemic demonstrates the fact that controversial topics with a scientific basis are going to be a continual reality in the church as our world advances, with new questions inevitably arising. Some of the notable divisive issues in the church are discussed in this review that represent the church's lack of scientific proficiency and exemplify the need for increased scientific literacy.

Conflicting Theories

Arguably, one of the longest standing debates between scientists and religious advocates is the creation of the world and its biological inhabitants. Within the church, the argument is often proposed as answers that are mutually exclusive – be religious or believe in evolution. Not much flexibility is seemingly given to the gray area. The lack of understanding becomes apparent in this completely opposed view as there are several other logical options that could more cohesively bring together scientific evidence with biblical truth. In addition, there are common misunderstandings within the church surrounding the evolutionary process that could further contribute to the continual debate. The following stances that are discussed include the currently accepted scientific theory of evolution, as well as the main alternatives proposed in the church, along with their popularity in the United States.

A. Atheistic Evolution

Atheistic evolution can be described as a belief that only natural processes are necessary to achieve the diversity of life that is present on earth today. The idea gained most of its traction from Charles Darwin's work in the 19th century, where he outlined in detail the process of natural selection as the mechanism through which evolution creates specific and complex biological traits (Darwin & Kebler, 1859). Natural selection depends on three characteristics of living beings, including the natural variation amongst a population of organisms, the heritability of genetic traits, and the ability for offspring to be genetically unique from their parents (Johnson & Lam, 2010). Utilizing these assumptions, natural selection describes the idea that the traits that are better suited to an organism's survival are more likely to be passed to future generations (Darwin & Kebler, 1859). This, along with the idea of genetic variation, allows for the

divergence of species based on environmental factors that influence survival. Natural selection can be directly observed as the phenomena commonly known as adaptation, or microevolution (Reznick & Ricklefs, 2009). On the other hand, macroevolution is the actual crossing of species lines and is partially the result of cumulated adaptations; however, most modern scientists agree that microevolution is not the sole explanation but that further evidence provided by ecology and paleontology are necessary to explain the speciation (Reznick & Ricklefs, 2009).

However, evolutionary theory, while heavily influenced by Darwin, has undergone marked development since his work. For instance, the genetic basis for evolution was not incorporated into the theory until 1942, after the work of Gregor Mendel, the father of genetics, where the alteration to evolutionary theory was known as the "Modern Synthesis" (Huxley, 1942). As scientific technology advances, there is continuous progress made on evolutionary theory as novel techniques and methods are developed, particularly in the field of genetics and common ancestry.

Atheistic evolution maintains that the natural processes of genetic variation, such as through natural selection, are sufficient; therefore, there is no need for a higher power orchestrating the events (Dawkins, 1986). The stipulation with these natural processes is that it requires significant amounts of time for slight generational changes to accumulate to large differences. Based on scientific evidence involving the dating of geological features, the earth is believed to be around 4.5 billion years old, allotting ample time for natural selection to account for the divergence on earth (Turner et al., 2020). Approximately 19% of Americans hold this view of atheistic evolution, believing that God had no part in the creation of humans and other life forms on earth (Gallup, 2019).

B. Intelligent Design

Intelligent design proponents argue that the complexity and interconnectedness of life do not reflect the randomness of purely natural processes, so there must be a conscious being behind the 'design' of the world (Johnson, 1991). A common metaphor used to describe intelligent design is that if one stumbled upon a watch in the forest, they would assume its design was the result of a watchmaker rather than the natural processes of the earth (Paley, 1839). However, intelligent design theory does not take a literal view of Genesis in terms of the age of the earth or completely deny natural processes, but actually uses natural phenomena as the very foundation of its claims, since these processes generally represent a high level of intentionality and order. Intelligent design does not inherently reject evolution either because a tangent theory known as theistic evolution entirely agrees with evolutionary processes with the caveat that they are under the authority of a higher power (Leidenhag, 2019).

Two fundamental tenets of intelligent design theory are irreducible complexity and specified complexity. Irreducible complexity explains that the functionality of living systems depends on too many factors for it to arise solely from slow adaptations in individual organisms (Woodill, 2015). In other words, viable biological systems could not participate in natural selection if the whole integrated unit did not already exist due to the necessity of each component for survival. If one component was removed or had yet to develop through evolution, the system would cease to function (Behe, 2005).

Specified complexity is the idea that living systems contain information with inherent complicated patterns (Dembski & Wells, 2008). For example, if a long string of letters was randomly generated, the result would be a complex letter code that would not be easily reproduced by chance; however, there would be no discernable pattern, making it nonspecific. On the other hand, the article adjective "the" denotes meaning despite its simplicity so it is

specified but not complex. Intelligent design proponents argue that nature alone cannot construct both specific and complex systems that every living organism possesses and classify specified complexity as evidence for intellect (Dembski & Wells, 2008).

Among Americans, approximately 33% believe in either intelligent design or theistic evolution, implying that they agree with many scientific claims but fundamentally believe that God is responsible for evolution to some degree (Gallup, 2019).

C. Young-Earth Creationism

Young-earth creationism the belief that the account of Genesis is a literal depiction of the history of the earth, stating that the earth is less than 10,000 years old and was entirely created in seven days by the Judeo-Christian God (Postiff, 2016). Young-earth creationism entirely rejects evolutionary theories and proposes that all beings were created as they are and have not diverged. One of the most important manifestations that have resulted from this theory is the notion that scientific evidence must be brought into agreement with the biblical account rather than sacrificing the authority of Scripture to fit with scientific observations (Postiff, 2016). Therefore, science does not possess authority with regards to creation.

Despite citing God's supernatural ability to overcome science as the cornerstone of this theory, many Christians experience inner conflict with their beliefs once they are exposed to other origin theories with seemingly more visible evidence (Haarsma et al., 2019). Importantly, this exposure to other theories occurs in higher education, making this theory mostly prevalent amongst religious populations with a lack of educational attainment (Lac, 2010). Among all of the life origin theories discussed, young-earth creationism is the most difficult to reconcile with scientific evidence as it hinges on the supernatural abilities of God, making the inner conflict that

its proponents have reported unsurprising. This theory is held by approximately 40% of Americans according to the national Gallup poll (Gallup, 2019).

D. Lack of Compatibility

One of the largest divisive issues between science and religion is the disagreement on the history of the earth due to its incorporation of faith in different perceived truths. As seen by the various percentages of Americans that ascribe to the different life origin theories, it is no mystery why the opposition between science and religion exists. The country is significantly split between the three main theories described above that all seem to feature mutually exclusive foundational beliefs.

Representative of this exclusivity, prominent works have been written by scientists that express the incompatibility of science and religion. Noteworthy publications such as *The God Delusion* or *The Blind Watchmaker* by Richard Dawkins bluntly explain the fallacy of religion's arguments against evolutionary theory and scientific claims, widening the divide between the two. Dawkins states in his introduction that "if this book works as I intend, religious readers who open it will be atheists when they put it down." (Dawkins, 2016). His attitude is not unique as several studies and practices have been implemented in order to maximize acceptance of evolutionary theory, particularly with students (Betti et al., 2020).

On the religious side of the argument, the disparity largely stems from the tendency of science to suggest historical timelines and facts that are not in agreement with biblical teachings that have become ingrained within the minds of religious members. Ultimately, the perception of science within religious communities can become one where it is attacking a principal source of comfort and identity, leading to significant distrust in scientific evidence with regards to its accuracy and motives (Moody & Reed, 2017).

Apart from disagreements regarding the history of the earth, modern questions continue to arise that require a deeper analysis of the fundamental aspects of a Christian worldview and consistent logic. As scientific advancement progresses, the general public becomes continually exposed to topics that call for this introspective evaluation of ethical frameworks, such as mental health diagnosis and treatment, reproductive technologies, and questions about the sanctity of life at birth and at death. By no means is this an exhaustive list, and the debate of these issues is not limited to the church as everyone must critically examine their stance on such topics; however, if the church wishes to maintain a consistent biblical stance on controversial developments, some level of scientific understanding on these subjects must exist.

Science-Religion Student Conflict

The main conflict that appears between a student's education and their religion is the discussion of life's origins because most religious education commonly exposes students to young-earth creationism theories (Long, 2018). If evolution is brought up in the church, it is usually in a negative context from anti-evolutionists who dismiss the theory without much discussion (Winslow et al., 2011). The consequence of creationism-only teaching is that students are sheltered from the faith-questioning ideas that evolutionary theory presents, which is then propagated by an unfamiliarity of the concepts as well as a lack of guided education (Tenneson et al., 2015). These students may then go on to further education where they encounter instructors who are either strongly in support of evolution or admittedly feel unprepared to help students reconcile biblical history with scientific evidence (Barnes & Brownell, 2018) However, it has been shown that increased levels of education regarding evolution reduce the amount of conflict that one experiences between their faith and science when it is presented in a non-confrontational way (Truong et al., 2018)

This is likely due to the fact that students are given the opportunity to resolve inconsistencies between their faith and scientific claims. Further supporting this idea is the finding that, when investigated longitudinally, people who sustained a mindset that faith was incompatible with science were found to have lower levels of religiosity over time when compared to people who had reconciled their faith with science in a compatible way(Uecker & Longest, 2017). With college students representing the largest age group that is unaffiliated with religion, it calls into question whether some are rejecting their faith due to presentations of strong scientific principles that they are unable to reconcile with their religious beliefs (*Statista*, 2017). In a sample of young adults who had renounced their Christian beliefs, 29% agreed that the church was out of touch with the scientific world, exemplifying the potential damage towards the church that has been instigated by the incessant conflict between religion and science (Kinnaman & Hawkins, 2011).

Current Ministry Curriculums

One of the ways to potentially lessen student's conflict between evolution and religion is if church leaders were equipped to discuss and answer questions about the theories in a scientifically literate way. However, the current seminary and ministry curriculums that many church leaders complete almost, if not totally, ignore this education. Liberty University, one of the world's largest Christian universities, only requires one natural science elective or math elective as part of the general education for a B.S. in Christian Leadership – Theology and Apologetics (*Liberty University*, 2020). The core classes for this major are void of any additional scientific education, despite having an emphasis on apologetics, which commonly utilizes science as a means of faith defense. The Southern Baptist Theological Seminary, a highly

regarded ministry education, offers one class that addresses scientific claims that is required for those pursuing a Masters in Apologetics. All other graduate degrees do not require this course, and there is no analogous course available for undergraduates in any degree (*The Southern Baptist Theological Seminary*, 2020). The curricula of these large ministry schools accurately represent the average courses that are offered by most ministry degrees, exemplifying a source of scientific illiteracy in the church.

Currently, there is only one major research project, conducted by the Association of Theological Schools, that is investigating scientific engagement within seminary programs with the hopes of incorporating more science education into the curricula of the schools (Hill & Gin, 2017). The faculty of these schools are aware of the pervasive lack of scientific knowledge as only 21% believe that their students are prepared to address scientific claims in their future ministries (Hill & Gin, 2017). Based on further interviews with the faculty, they found that scientific engagement at seminary schools heavily included areas such as sociology, anthropology, and psychology but with very little emphasis on biology and earth science (Hill & Gin, 2017). In addition to these findings, they reported that a quarter of faculty wanted to include additional scientific topics in their class but did not do so for lack of time and/or knowledge on the subject (Hill & Gin, 2017). Another main finding to note from this research is that the most important factor that predicted whether or not a faculty discussed scientific claims in their class was their position on earth's origins. Young-earth creationists were the least likely to incorporate scientific discussion in their classrooms, while theistic evolutionists often engaged with science and were largely responsible for the group advocating for more science education (Hill & Gin, 2017).

When a course was introduced that incorporated faith with science, 76% of the students that took the class reported that it strengthened their personal faith, despite the class covering many biological topics (Savarirajan & Fong, 2019). A similar integrative science course was taught by a neuroscientist in order to bolster elementary views on science and religion with overwhelming positive feedback from the students, markedly reporting greater understanding and openness to discussion with regards to difficult concepts (Klemm, 2017).

While these classes show the usefulness of integrating science with faith, they are uncommon amongst ministry colleges. There is still a clear need for widespread scientific education for those pursuing careers in the church in order to effectively understand scientific claims and guide those in the church towards increased scientific understanding. With additional education and comprehension, the battle between scientific and religious advocates, as well as the inner conflict commonly seen in religious students, will certainly be diminished. Providing scientifically knowledgeable leaders in the church will also discourage the large number of young adults that leave the faith due to scientific claims they were unable to resolve partially because the leadership in their church was ill-equipped to provide information on such claims. With new educational measures, the resulting increase in the perceived compatibility between faith and science will undoubtedly propel the church towards a future marked by unity and relevance within a scientific world.

METHODOLOGY

Increasing scientific literacy in the church will aid in increasing the unity between science and religion within individual church members as well as the church's societal relevance. In order to prepare future church leadership for scientific questions in the church, this study proposes a curriculum for undergraduates obtaining education for a career in ministry that will help expose them to scientific topics, understand reliable sources, and ultimately, teach them how to incorporate the study of science into their biblical worldview so that they can be more effective in leading others.

Research Design

In order to gain the best insight on how scientific literacy is perceived by church leadership, this primarily quantitative study consisted of a survey that is sent to pastors at churches of varying denominations and locations within the United States. Pastors were selected as they are often the best source of information as they have extensive knowledge regarding their own congregation's needs and will have seen the effects of the polarization between science and the church better than any other population. While the end goal of this study was to create a curriculum, gaining information from academic faculty in ministry education will fall short when compared to the experiential comprehension that comes from a vocational career in the church. Additionally, including a variety of denominations and locations granted the study a widespread perspective among doctrines and increase the applicability of the study. Within the quantitative survey, there was one open-ended question that allow for more of a qualitative understanding of what knowledge would most benefit the church. With the results of the survey taken into consideration, a curriculum was constructed that includes the most applicable topics mentioned by current pastors.

Research Questions

How can the scientific literacy of the church be improved through education?

What specific scientific topics do professors/leaders in ministry need to understand?

Participants

The specific population of pastors was obtained through the extension sites associated with Southeastern University. There was a sample size of 12 pastors from varying denominations and locations. It was a convenience sampling with a voluntary response due to the limits of the study.

Data Collection

Data from the survey was collected by utilizing the software Qualtrics. The survey was sent out via email and consisted of fifteen questions designed to yield information about the pastor's perception of scientific topics in the church. The survey questions were submitted to the Institutional Review Board for approval prior to being sent to ensure the rights and welfare of the subjects were protected. Fourteen of the questions consisted of quantitative responses using the Likert scale (1-5) while the final question was open-ended. Responses were typed and archived within the survey. The survey used for this study was created specifically for this research project.

A major limitation of this study is the small sample size, so for that purpose, the data from the survey was not analyzed for statistical significance. Its purpose will be to serve as a guideline for the proposed additional education that is needed for church leadership, as well as allow insight into the opinions of current pastors regarding the collaboration of Christianity and science.

Survey Questions

1. How would you define your own understanding of scientific language?
2. How would you define your own understanding of the scientific method?
3. How would you define your own scientific understanding of evolution?
4. How would you define your own scientific understanding of mental health?
5. How would you define your own scientific understanding of vaccines?
6. How would you define your own scientific understanding of contraceptives (birth control)?
7. How confident would you be in answering a question from a church member regarding a scientific topic?
8. How relevant do you believe scientific knowledge is to the church?
9. In your pastoral education, how would you describe your exposure to scientific topics?
10. To what level do you believe Christianity is compatible with science?
11. How confident would you be in researching reliable sources in order to answer a question with a scientific basis?
12. To what degree do you believe scientific evidence leads to doubt in the church?
13. In your opinion, how effective is the church in reconciling scientific evidence with a biblical worldview?
14. To what degree do you believe the church needs to improve its scientific literacy?
15. What denomination do you identify with? What (if any) scientific topic do you wish you were more knowledgeable on that would benefit your ministry?

Summary of Methodology

In order to increase the scientific literacy in the church, this study proposes a curriculum for undergraduate students pursuing a career in ministry that will teach basic scientific understanding and reliable researching skills. The goal of this additional education is so that church leadership can better advise people in their ministries towards logical conclusions in light of both their faith and scientific advancements. Before the curriculum was developed, a sample size of 12 Christian pastors from varying denominations were sent an original, quantitative survey that was previously approved by the IRB. Based on the analysis of the responses, a sample curriculum was composed of the scientific topics that current church leadership believes would be beneficial based on their experiences.

RESULTS

The survey received 12 responses in total from site directors of Southeastern University, most of which are youth pastors. The widespread distribution of survey responses around the United States is represented in Figure 1. Responses were received from the following cities:

Dallas, TX

Houston, TX

Spokane, WA

Chicago, IL

Orlando, FL

Tampa, FL

Oxnard, CA

Boston, MA

Virginia Beach, VA

Most of the responses were from larger, more metropolitan cities. While the survey included a question regarding denominational affiliation, no response included this information. The responses are summarized in Table 1 by each question, as well as Figure 2. Due to the small number of survey responses, only the means are reported. All questions with a given mean were answered on a Likert scale (1-5) so a normally distributed response is considered 2.5. The free responses that were provided are included as well.

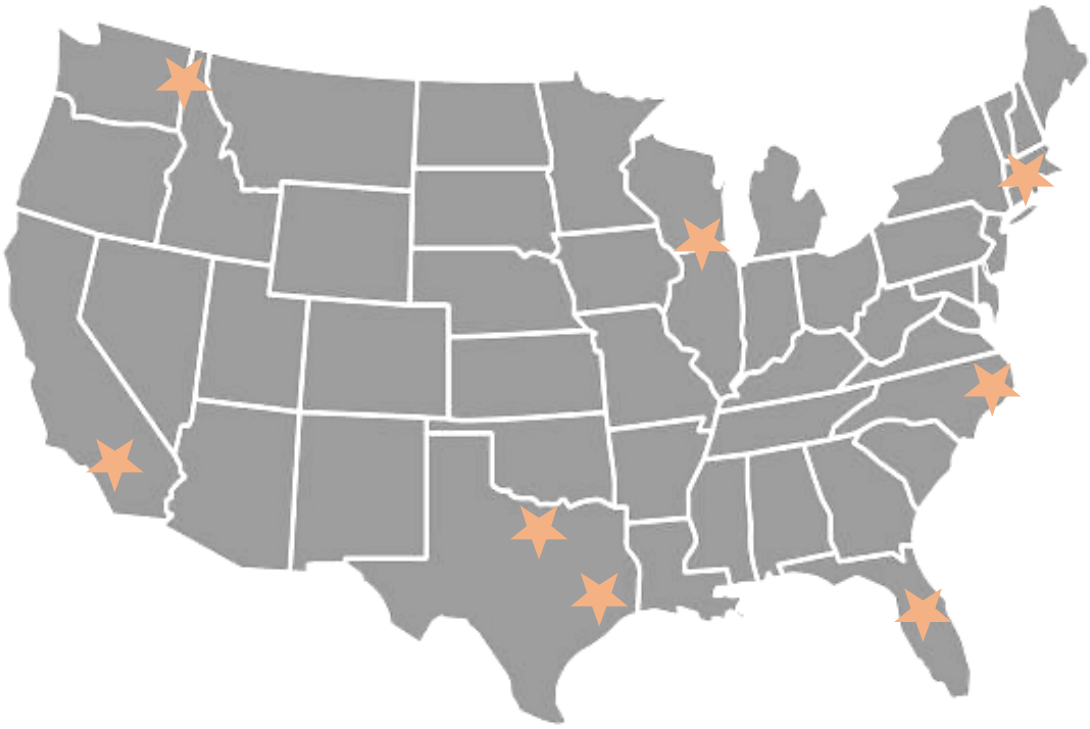

Figure 1. Distribution of survey responses by location. Stars may represent more than one response and are used as a visual to demonstrate the broad scope of locations.

Table 1.

Question	Mean
Q1 - How would you define your own understanding of scientific language? (1 - very little, 5 - proficient)	3.33
Q2 - How would you define your own understanding of the scientific method? (1 - very little, 5 - proficient)	3.83
Q3 - How would you define your own scientific understanding of evolution? (1 - very little, 5 – proficient)	3.27
Q4 - How would you define your own scientific understanding of mental health? (1 - very little, 5 - proficient)	4.00

Q5 - How would you define your own scientific understanding of vaccines? (1 - very little, 5 - proficient)	2.91
Q6 - How would you define your own scientific understanding of contraceptives (birth control)? (1 - very little, 5 - proficient)	3.55
Q7 - How confident would you be in answering a question from a church member regarding a scientific topic? (1 - not confident, 5 - very confident)	3.08
Q8 - How relevant do you believe scientific knowledge is to the church? (1 - not relevant, 5 - very relevant)	3.92
Q9 - In your education, how would you describe your exposure to scientific topics? (1 - no exposure, 5 - heavy exposure)	2.50
Q10 - To what level do you believe Christianity is compatible with science? (1 - not compatible, 5 - totally compatible)	4.75
Q11 - How confident would you be in researching reliable sources in order to answer a question with a scientific basis? (1 - not confident, 5 - very confident)	3.83
Q12 - To what degree do you believe scientific evidence leads to doubt in the church? (1 - no doubt, 5 - extensive doubt)	2.64
Q13 - In your opinion, how effective is the church in reconciling scientific evidence with a biblical worldview? (1 - not effective, 5 - very effective)	2.00
Q14 - To what degree do you believe the church needs to improve its scientific literacy? (1 - needs no improvement, 5 - needs significant improvement)	4.17

Q15 - Open-Ended: What denomination do you identify with? What (if any) scientific topic do you wish you were more knowledgeable on that would benefit your ministry?

“Human development for adults in their early 20s”

“Psychology/Mental Health”

“Psychology, brain development, cultural anthropology”

“mental health”

"I've gained quite a bit of scientific knowledge from my own study, but wish the church was more involved or took more initiative to share Christian Science resources with their resources with their attendees"

The vast majority of the responses were above average (2.5), with the exception of Q13 – "In your opinion, how effective is the church in reconciling scientific evidence with a Biblical worldview?" – which had a mean of 2.00. The only other question that did not report an above average mean was Q9 – "In your education, how would you describe your exposure to scientific topics?" – with a mean of 2.50. The highest value was reported from Q10 – "To what level do you believe Christianity is compatible with science?" – with a mean of 4.75. Of the topical questions (Q1-Q6), the topic with the highest self-reported understanding was mental health with a mean of 4.00. The lowest understanding was reported with the topic of vaccines with a mean of 2.91.

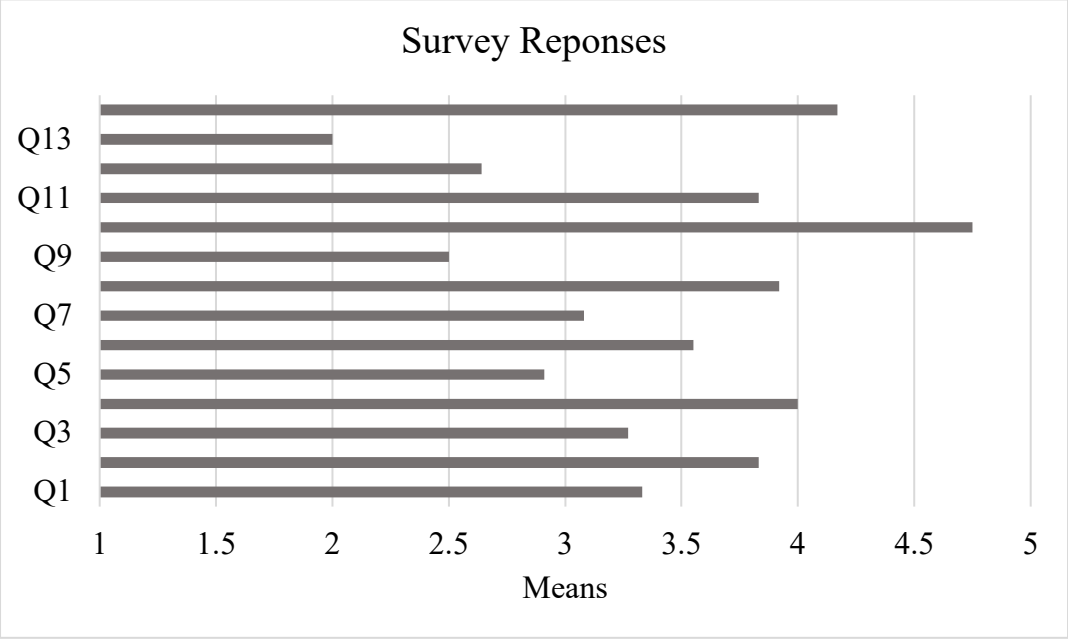

Figure 2. Summary of survey response means.

DISCUSSION OF RESULTS

Despite the low rate of responses, several interesting insights can be identified from the data. Beginning with the topical questions, as stated above, the highest level of understanding was reported for mental health. However, when the participants were asked to describe which scientific topic they wish to be more knowledgeable in, the main response pertained to mental health. This possibly indicates that despite their highly reported level of understanding, there still remains a significant lack of knowledge on the field of mental health in the church. It also supports the notion that increased understanding of mental health would benefit the church's ministry. A likely reason for the focus on mental health may be the fact that most of the subject pool are youth/college pastors, which lead an age group where discussions about mental health are more prevalent.

Another interesting trend that was seen was an above average (>2.5) self-reported understanding of all scientific topics inquired of in this survey. This result was unexpected due to the presumable lack of scientific education that is present in many ministry degrees. Additionally, when asked about the level of scientific exposure in their education on this survey, the respondents reported an average of 2.5, which was one of the lowest values. A lower reported average for this question supports the idea that there was seemingly little exposure to scientific topics in their education, but they still feel somewhat confident in their understanding of these topics. However, these results were self-reported and may not be indicative of the actual level of understanding that these respondents possess. It is also possible that the demographic for this survey tended to be younger since the majority of the subject pool were youth pastors, which could have contributed to survey results that exemplify a more progressive view of science in the

church. This cannot be confirmed as no data was collected on the age of respondents, but this would be an interesting avenue for future research.

While the respondents stated that they were, on average, somewhat knowledgeable about these common scientific issues, they reported that the church is lacking in scientific literacy. The lowest average response on this survey was to the question regarding the church's current ability to reconcile science with a Christian worldview, while one of the highest average responses pertained to the church's need for improved scientific literacy. Both of these responses suggest that leaders in the church are aware of the lack of scientific understanding amongst congregations and potentially the leadership and see the importance in gaining this knowledge. This creates an interesting dichotomy, as these leaders maintain that the church as a whole needs substantial improvement, but in their opinion, they are moderately educated. As mentioned previously, it is possible that these respondents are actually more knowledgeable on scientific topics due to their demographic; however, it is also possible that they are overestimating their knowledge. While they observe a disparity between science and the church, they do not see themselves as leaders who perpetuate this division because of a lack of knowledge. In other words, they do not believe they need as much improvement as the whole church needs. This conclusion is supported by the fact that all of the self-reported averages for topical understanding, confidence in researching scientific topics, and ability to answer questions from the congregation were substantially higher than the reported value for the church's ability to reconcile science with religious beliefs. This begs the question, where is the problem? If current leadership believes that they are able to adequately integrate science with their religion but also believe that there still exists a significant disparity, then who or what is creating this disparity? The answer may be that current leadership, as a result of their minimal scientific education, are

unaware of their lack of knowledge, and therefore, are unintentionally contributing to the conflict between science and religion.

Another interesting result was the fact that the average response for the question, “To what level do you believe Christianity is compatible with science?”, was 4.75 with 5 being “totally compatible”. This was by far the highest value from among the survey questions, indicating that these leaders believe that it is possible to effectively reconcile scientific discovery with the tenets of Christian faith. The respondents maintaining that this compatibility is achievable adds merit to the idea of increased education as a means for this possibility to be realized. As described earlier, the other responses suggest that the compatibility between science and Christianity is not a reality of the church as it stands today and needs to be remedied.

PROPOSED CURRICULUM

Based on the analysis of the survey responses, along with the goal of developing proficient critical thinking skills and the exposure to scientific topics, a certificate program in scientific literacy for those pursuing ministry degrees is proposed to be developed with the following existing classes at Southeastern University:

- NSCI 1023 – Intro to Science and Tech and Lab
- BIOL 2113 – Bioethics
- PSYC 3003 – Abnormal Psychology

These classes were selected since they do not require extensive prerequisite scientific knowledge but will provide maximum exposure to scientific issues, opportunities for discussion, and provide basic scientific understanding for the student with minimal scientific background. The following intended learning outcomes for each course are provided below to provide further explanation and justification for their inclusion.

Intended Learning Outcomes

NSCI 1023 – Intro to Science and Tech

- Demonstrate an understanding of the nature of scientific knowledge and inquiry.
- Apply scientific concepts, principles, laws, and theories to generate multiple solutions to contemporary issues.
- Apply scientific principles to solve problems, make decisions, and further understand nature and technology.
- Demonstrate an awareness of the interrelationship of science, technology, and society.
- Cultivate the confidence to confront scientific and technological issues in areas such as human health, energy, and the environment.

BIOL 2113 – Bioethics

- Discuss, defend, support, and critique various ethical arguments.
- Summarize and research historical cases that shape and define bioethical issues.
- Explore and explain scientific/clinical/medical procedures or techniques and compare them to current trends or technologies.
- List the policies and laws that govern bioethical issues.

PSYC 3003 – Abnormal Psychology

- Demonstrate a basic understanding of the historical and contemporary perspectives of abnormal behavior.
- Demonstrate a basic understanding of the procedures and methods used to assess and classify abnormal behavior.
- Identify, describe, and explain the nature and qualifying characteristics of various forms of abnormal behavior, including the differential characteristics that distinguish one mental disorder from another mental disorder.
- Identify, describe, and explain various approaches to treating mental disorders.
- Apply critical thinking skills to the assumptions and evaluations made of human behavior by the media, social scientists, academicians, friends, and family.
- Display a sensitivity toward and understanding of those whose lives have been touched by mental illness.
- Apply a biblical worldview of abnormal behavior and psychopathology.

These intended learning outcomes are predicted to significantly improve the scientific literacy of students who are pursuing leadership in the church, in addition to providing the

foundation for knowledgeable inquiry as scientific controversies may arise. In order to quantitatively measure this improvement, an assessment should be given in company with these courses. Existing research developed a student self-assessment for scientific literacy known as SCILIT in order to define scientific literacy across all disciplines, including non-science majors (Vandegrift et al., 2020). This self-assessment would be particularly insightful when analyzing the student's perception of their gained knowledge from the certificate program. Including a quantitative measure of scientific literacy would be a vital addition to the proposed curriculum in this research as it would provide tangible evidence of the accomplished learning outcomes. This would provide crucial information into possible adjustments to the course so that it reaches maximum effectiveness for students who are not well versed in science to begin with. Additionally, it would allow students to better understand the goals of the course and provide an opportunity for self-reflection on what was learned. The following items included in the assessment are listed below and rated on a Likert (1-5) scale:

1. I can critique claims and make an informed decision.
2. I can separate credible scientific information from opinion, conjecture, fabrication, and embellishments in advertisement.
3. I seek out good information upon which to base decisions and opinions.
4. I can identify assumptions.
5. I approach societal issues from skeptical and critically reasoned perspective.
6. I understand how science works (e.g., the "process" of science, how scientists ask and answer questions using the scientific method).
7. I am aware of common societal issues that might be addressed by application of skeptical and critically reasoned perspective.

8 .I understand science as presented in popular media.

This assessment would be most beneficial if given at the beginning and the conclusion of the additional education in order to see if the classes achieved the intended learning outcomes, with the emphasis placed on approaching questions with reasoning and critical thinking.

FUTURE DIRECTIONS

In order to further advise on possible curriculum additions, it would be beneficial to conduct this survey on a larger scale that includes demographic data to identify correlations or trends with location, age, or ethnicity. A larger sample size with a broader subject pool would make it possible to determine statistically significant trends and therefore, more meaningful and probable conclusions regarding the integration of science in the church. It would also be prudent to investigate the assorted differences between leaders of various denominations. Obtaining this additional data would allow for a more thorough understanding of where church leadership currently stands on scientific inclusion, as well as identify which doctrines or populations may be more open to strengthening the scientific knowledge of church leadership and congregations. All of this research would yield more refined educational proposals that are effective at developing the scientific literacy of church leadership.

CONCLUSION

Due to the existing disparity between religion and science, increased education for future church leadership is necessary to help bridge the gap of misunderstanding between the church and scientific development. The purpose of this research is to propose a potential curriculum for aspiring church leadership, informed by current leadership, that can begin to close the gap between science and religion. The goal of this curriculum is to ultimately educate future students on the broad strokes of current scientific topics, as well as teach them the skills necessary to understand the process of science and be able to reliably research a potential scientific issue.

Hopefully, the insights gained from the completion of this research will be able to be incorporated into the education of future church leadership so that they can guide their congregations toward logical conclusions backed by evidence when scientific issues arise. Whether these issues concern mental health, precautions in a pandemic, vaccinations, birth control, or any other question in the ever-increasing list of scientific controversy, the church will be able to respond with greater discernment if the leadership is educated towards more thorough scientific understanding. In addition to the benefit of scientific literacy providing a way for the church to maintain its relevance in the world, it is anticipated that it will also decrease personal doubts as those with this education will be better equipped to unite their faith with scientific evidence instead of it being contradictory.

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APPENDIX

Q1 – How would you define your own understanding of scientific language? (1 – very little, 5 – proficient)

Minimum	Maximum	Mean	Std Deviation	Count
2.00	4.00	3.33	0.62	12

Q2 – How would you define your own understanding of the scientific method? (1 – very little, 5 – proficient)

Minimum	Maximum	Mean	Std Deviation	Count
2.00	5.00	3.83	0.90	12

Q3 – How would you define your own scientific understanding of evolution? (1 – very little, 5 – proficient)

Minimum	Maximum	Mean	Std Deviation	Count
2.00	4.00	3.27	0.62	11

Q4 – How would you define your own scientific understanding of mental health? (1 – very little, 5 – proficient)

Minimum	Maximum	Mean	Std Deviation	Count
3.00	5.00	4.00	0.85	11

Q5 – How would you define your own scientific understanding of vaccines? (1 – very little, 5 – proficient)

Minimum	Maximum	Mean	Std Deviation	Count
1.00	4.00	2.91	1.00	11

Q6 – How would you define your own scientific understanding of contraceptives (birth control)? (1 – very little, 5 – proficient)

Minimum	Maximum	Mean	Std Deviation	Count
2.00	5.00	3.55	0.78	11

Q7 – How confident would you be in answering a question from a church member regarding a scientific topic? (1 – not confident, 5 – very confident)

Minimum	Maximum	Mean	Std Deviation	Count
1.00	4.00	3.08	1.11	12

Q8 – How relevant do you believe scientific knowledge is to the church? (1 – not relevant, 5 – very relevant)

Minimum	Maximum	Mean	Std Deviation	Count
1.00	5.00	3.92	1.19	12

Q9 – In your education, how would you describe your exposure to scientific topics? (1 – no exposure, 5 – heavy exposure)

Minimum	Maximum	Mean	Std Deviation	Count
1.00	5.00	2.50	0.96	12

Q10 – To what level do you believe Christianity is compatible with science? (1 – not compatible, 5 – totally compatible)

Minimum	Maximum	Mean	Std Deviation	Count
4.00	5.00	4.75	0.43	12

Q11 – How confident would you be in researching reliable sources in order to answer a question with a scientific basis? (1 – not confident, 5 – very confident)

Minimum	Maximum	Mean	Std Deviation	Count
2.00	5.00	3.83	1.21	12

Q12 – To what degree do you believe scientific evidence leads to doubt in the church? (1 – no doubt, 5 – extensive doubt)

Minimum	Maximum	Mean	Std Deviation	Count
1.00	4.00	2.64	0.88	11

Q13 – In your opinion, how effective is the church in reconciling scientific evidence with a biblical worldview? (1 – not effective, 5 – very effective)

Minimum	Maximum	Mean	Std Deviation	Count
1.00	3.00	2.00	0.43	11

Q14 – To what degree do you believe the church needs to improve its scientific literacy? (1 – needs no improvement, 5 – needs significant improvement)

Minimum	Maximum	Mean	Std Deviation	Count
3.00	5.00	4.17	0.55	12

Q15 - Open-Ended: What denomination do you identify with? What (if any) scientific topic do you wish you were more knowledgeable on that would benefit your ministry?

“Psychology/Mental Health”
“Psychology, brain development, cultural anthropology”
“mental health”
“I've gained quite a bit of scientific knowledge from my own study, but wish the church was more involved or took more initiative to share Christian Science resources with their resources with their attendees”