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Teaching creation: ancient belief meets modern science

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Abstract Teaching about creation today requires careful consideration of biblical insight and scientific discoveries. Based upon the author's professional teaching experience and several external research studies, a dialogical means of teaching brings life to the topic. The paper begins by explaining changes in biblical studies that re-established the theological importance of creation. It next clarifies differences between religious and scientific knowledge in order to avoid common misconceptions and establish a possible dialogue for deeper understanding of human reality. The article concludes by offering practical suggestions for teaching about creation in light of the dialogue between faith and science: What is the origin of the universe? What is the origin of human beings? What will be the universe's end? Why should I care about the Earth? In shaping learning around some of life's big questions, students discover a more tangible understanding of creation within a modern scientific world.

Keywords Creation · Science · Theology · Teaching · Young adult

The Nicene Creed professes:

> We believe in one God, the Father, the Almighty,
> Maker of heaven and Earth, of all that is, seen and unseen…
> We believe in one Lord, Jesus Christ…
> Through him all things were made…
> We believe in the Holy Spirit, the Lord, the Giver of life…

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In this ancient creed, creation is undoubtedly professed as foundational for Christian belief. The threefold repetition of God as Creator strongly asserts belief in a God from whom all things come.[1]

Creation's essential place in ancient Christian belief does not translate easily into learning for young people today. Educators Rymarz and Graham found high school students' knowledge of the doctrine was limited, reflecting complexities surrounding the teaching.[2] Creation is particularly difficult to understand because it requires knowledge not only of the Christian faith but also of contemporary, scientific understanding. Reflecting upon the religious meaning of the physical world naturally leads to consideration of insights from modern science. Educationally speaking, creation functions at the meeting point of faith and science, addressing some of life's big questions like *What are my origins?* or *What is the universe's end?* Multiple studies with undergraduate and high school students have determined that students need appropriate skills to engage these questions because it is not uncommon for some students to personally view science and religion in opposition, or even understand scientific fields of thought (like physics or biology) as *de facto* anti-religious.[3] This challenge has consequences for educators. For instance, Hall et al. found that most surveyed religious educators and science teachers in Scottish high schools wanted more collaboration with each other to increase student learning in the area.[4] For religious educators in faith-based learning environments, an examination of life's big questions stemming from religion and science not only must be addressed but naturally occurs in discussion about Christian belief in creation.

As a professor of religious education in Canada, I have developed meaningful ways to teach the topic of creation in an undergraduate course.[5] Enrolled students have been primarily pre-service teachers who hope to teach in local Catholic schools. Because of the foundational importance of the teaching and related concerns highlighted in empirical evidence, this article sets out a framework of central questions in related topics from science and religion for religious educators. This paper is composed of three parts. The first provides a brief reasoning for the topic's renaissance in recent decades and affirms the foundational role of the teaching of creation in religious education. Building upon the biblical importance of creation, the second part clarifies how faith in a Creator can interact with current scientific thinking. Specifically, this part gives an introduction to epistemological differences between theological and scientific knowledge for the appropriate interpretation of creation biblical accounts. The final part addresses four "big" questions about humankind's origins and ends. These require both theological and scientific knowledge for learners in modern society. A dialogical model for teaching creation considers these areas of knowledge for learning as directed by classroom experience and empirical research. Overall, the paper contributes to the field of religious education by engaging a contemporary vision of creation that is scientifically-sound, biblically-based, theologically-relevant, empiricially-concerned, and supportive of ancient beliefs that anchor the purpose of Catholic education.

[1] Marthaler (1993).

[2] Rymarz and Graham (2006).

[3] Billingsley et al. (2013, p. 1729), Sherkat (2011), Hansson and Redfors (2007, p. 475).

[4] Hall et al. (2014).

[5] The author has taught a religious education course—CHRTC 381—fourteen times between 2008 and 2015.

1 Why creation?

Why might the topic of creation be overlooked in undergraduate theological learning? The recent history of biblical studies on the topic offers insight. Old Testament scholar Brueggemann explains how research into creation was downplayed, even outright avoided, during the political trends in pre-WWII Germany.[6] Biblical scholar von Rad, building upon the argument of theologian Karl Barth, stipulated that the doctrine of creation was peripheral to the Old Testament.[7] Von Rad framed his argument based upon the tension between the Canaanite God Baal and the Israelite God Yahweh. There was a clear divide placed between the two, as the Canaanite religion was viewed as utterly different from the Israelite faith. This mirrored the situation of von Rad, who seems to have compared the Canaanite Baal religion to the "Blood and Soil" religion of German National Socialism. Brueggemann explains:

> Von Rad's cultural context caused him to pose the question as he did, because Canaanite Baal religion with its accent on fertility was easily paralleled with 'Blood and Soil' religion in Germany. In so doing, he made creation a quite marginal matter in Old Testament theology, and his decision had far-reaching consequences.[8]

By connecting religion based on fertility and creation, von Rad overlooked the significance of creation in biblical studies. Brueggemann, however, reports a counter-shift in the second half of the twentieth century which seeks to re-establish belief in God the Creator as a major element in the Old Testament.[9] Instead of dismissing the topic, creation became seen as a fundamental element, a topic held together in tension with Israel's history. Further, it became apparent that wisdom literature in the Old Testament offered much insight into a theology of creation and, subsequently, into natural theology. Brueggemann concludes that by the end of the twentieth century, Old Testament scholarship could assert creation as the horizon of biblical faith. The benefits of this, Brueggemann explains, are that a developed notion of creation allows for contact between theology and science, and thus can encourage Christians to contribute to resolution of the ecological crisis.[10] From this renewed perspective, creation holds much promise for significant theological learning and ensures that the Christian faith is not left talking to itself.

2 Creation, faith, and science

As stated above, engaging the topic of creation enables learners to theologically consider scientific findings. This begins by establishing epistemological boundaries for each field of study. Philosopher McMullin explains that there needs to be room to discuss the physical universe from both religious and scientific perspectives.[11] A purely exclusivist position that refutes the assistance of philosophical or theological explanations is unnecessary. Instead, McMullin asserts that philosophy and theology can work cooperatively with the scientific

[6] Brueggemann (1996).

[7] von Rad (1984, pp. 53–64).

[8] Brueggemann (1996, p. 178).

[9] Brueggemann (1996, p. 187).

[10] Brueggemann (1996, pp. 187–188).

[11] McMullin (1985).

endeavor. He offers a perspective that is inter-disciplinary and argues that it is needless to posit the two fields of thought against one another. He explains,

> Theology and science deal for the most part with different domains of the same reality. Science has no access to God in its explanations; theology has nothing to say about the specifics of the natural world. Where the two, however, may overlap and thus interact is in the *human* domain: each has things to say about the nature of the human reality.[12]

While this explanation highlights an epistemological difference, it also underlines how the lived reality of human beings leads to wondering about the make-up and existence of the universe from both scientific and religious perspectives. This convergence is intellectually helpful for learners, leading to possible spiritual insight.

The point is clearly demonstrated by theologian Haught. In arguing against exclusive scientific explanations to life's big questions, Haught offers a simple but effective metaphor. He explains that there are many "levels of explanation" in understanding the universe.[13] Using the example of a campfire in his backyard, he illustrates many possible reasons for the fire: a chemical reaction, an evolutionary need, or simply his love of marshmallows. Explanations about natural phenomena can be determined by scientists, but they cannot provide a comprehensive response for all realities. The same can be said for God's action in creation: by its very nature, this is outside the scientific scope.[14] Haught thus asks his readers to turn their attention to another level of experience: religious persons recognize "having felt, beneath all sensible appearances, the very real presence of an elusive mystery that takes hold of them, invites them, sometimes unsettles them and often reorients their lives".[15] People grasp this presence—or feel grasped by it—and sense that this mystery cannot be reduced to only scientific explanations. Many levels of explanation are needed for learners to understand their human reality.

Distinguishing between the aims of theology and science enables learning about creation.[16] For science, the object of study is the physical world and how things work within this sphere. Theology, on the other hand, is a quest for truth about God and is an encounter with this transcendent mystery. The former focuses on *how* the world works; the latter seeks to know *why* it even exists. Making this distinction allows the two fields of thought to interact with clarity. This, in turn, enables a better understanding of human reality, as promoted above by McMullin. Without this epistemological clarification between these areas of study—and endorsement of the merit of a dialogue about human reality—several misconceptions will arise. Students may mistakenly look for God in areas of study yet to be understood by scientists (i.e., God of the Gaps approach), choose only those scientific theories that align with their beliefs (i.e., the intelligent design movement), or completely separate science from faith with no concern for the human domain (i.e., NOMA—non-overlapping magisteria).[17] Instead, young people must note distinctions and think from a viewpoint of complementarity that can overcome adversarial epistemological–philosoph-

[12] McMullin (1985, p. 39).

[13] Haught (2006, p. 16).

[14] Haught (2006, p. 17).

[15] Haught (2006, p. 21).

[16] Polkinghorne (2011).

[17] Peters and Hewlett (2003).

ical systems of thought like naive realism or logical positivism.[18] Descriptors like "points of contact" and "overlap" can serve as a means to illustrate how science and religion relate to one another and why a dialogue is needed. Taking this approach allows students to engage biblical teaching about creation while also being informed by today's science.

3 Engaging some of life's big questions

Examining creation—as informed by scientific findings—enables learners to reflect upon human reality more fully. As one study found, engaging scientific findings naturally leads many undergraduate students to ponder their religious beliefs and their significance.[19] In addressing some of life's big questions—*Where did we come from? What are my origins and end? What is my purpose?*—students think about complex questions of meaning directly addressed in the ancient teaching of creation.

Mirroring the work of McMullin, Haught, and Polkinghorne, I use a dialogical educational method with students. On a given topic, we examine both fields of thought separately and then look for points of contact or overlap. We ask: *How does this finding in science relate to biblical belief in creation (or* vice versa*)?* Establishing a climate supportive of religious beliefs and open to discussion is essential for students seeking convergence between theological and scientific thought. The teaching about creation, in effect, becomes foundational for learning while reflecting ancient creedal belief.

3.1 What is the origin of the universe?

Modern cosmology tells us that while the universe is about 14 billion years old, it met certain requirements for human beings to later observe and ponder its existence. For the kind of universe we inhabit to evolve, initial conditions were needed to support intelligent life much later on. This means that the chances of the universe having certain levels of various physical factors, along with their precise alignment and support of exact physical laws, would seem very remote. Scientist Francis Collins—in highlighting some of these as the speed of light, the strength of the weak and strong nuclear forces, various parameters associated with electromagnetism, and the force of gravity—concludes that "the chance that all of these constants would take on the values necessary to result in a stable universe capable of sustaining complex life forms is almost infinitesimal."[20]

While this idea of the anthropic principle does not prove the existence of an intelligent designer, it peaks students' curiosity about the near impossibility of our existence. This in turn can provoke a sense of awe and gratitude, encouraging wonder toward the world inhabited. This sense of gratitude is apparent in many creation texts, such as Psalm 104: God's sovereignty marks the entire universe as the psalmist marvels at the world's composition.[21] The text poetically wanes about God's creative power in making the heavens (vv. 1–4), the Earth (vv. 5–13), people (vv. 14–23), and all things (vv. 24–30).[22] It also reflects a prescientific understanding of creation (e.g., the passing of seasons according to

[18] Reich (1991, p. 87).

[19] Shipman et al. (2002).

[20] Collins (2006, p. 74).

[21] Hayes (2001, p. 30).

[22] McCann (1996, p. 1097).

the moon (v. 19) and the habitats of birds and animals (vv. 16–22)). Overall, it proclaims the belief that everything is continuously dependent upon God for life: "when you open your hand, they are filled with good things" (v. 28), "When you hide your face, they are dismayed; when you take away their breath, they die and return to their dust" (v. 29), and "When you send forth your spirit, they are created; and you renew the face of the ground" (v. 30). The psalmist proclaims creation as dependent upon God from its beginning and in its continuing evolution.

Undergraduate students find it helpful to practically determine differences and similarities between the beliefs of Psalm 104 and the remote possibility of intelligent life according to the findings of the anthropic principle. Once the obvious is named—that is, that the biblical text reflects an ancient understanding of the natural world—students read the Old Testament text with a refreshed sense of awe toward the workings of the universe. Psalm 104 speaks metaphorically about a Creator who guides the order of all things like an architect. This, of course, reflects assumptions drawn from the anthropic principle. Instead of choosing between a world directly created by God or simply without a Creator, this psalm and the anthropic principle enable students to understand their existence both in theological and scientific terms. This convergence in learning about creation increases greater appreciation of and wonder toward the arrival of human beings in the universe.

3.2 What are the origins of human beings?

The theory of evolution proposes that all living species—including human beings—have descended from a small group of common ancestors. Because variations occurred within species dependent upon the capacity to adapt to the surrounding environment, developments over long periods of time resulted in species being more or less able to survive in their habitats (i.e., natural selection). Evolutionary theory is not a mere hypothesis among other scientific guesses, of course, as it unifies diverse concepts and acts as a foundation for the biological sciences.[23]

I find there remains a significant minority of students who question the validity of evolutionary science due to their biblical understanding of creation. More specifically, they intuitively feel, as reflected in the work of Ha, Haury, and Nehm (2012), that a scientific worldview challenges a biblically-based, ordered creation. In response, it is necessary to analyze the first story of creation in Genesis (1–2:4a). Avoiding a literal interpretation, it is important to point out the obvious scientific errors in the text: a body of water that lies beyond the sky (vv. 6–8), plants that appear before the formation of the Sun (vv. 9–13), and light that exists prior to the Sun (and Moon) (vv. 14–19). Also to be scrutinized are student attempts to correlate the 6 days of creation with time epochs in the Earth's development following a biblical concordist approach.[24] This clearly conflicts with the geological record, not to mention evolutionary theory. In contrast, it is invaluable to highlight the text's poetic arrangement where the first 3 days and the last 3 days are in parallel structure. This clarifies the author's primary aim: to depict the glorious order of creation instead of empirically defining the Earth's origins.[25]

Challenging a literal reading of Genesis, as noted by Mpeta et al. (2014), threatens some students' deeply rooted theistic beliefs. Thus, it is necessary to examine the historical context of the biblical text—especially the influence of ancient Near Eastern texts of the

[23] Collins (2006, p. 99).

[24] Lamoureux (2009).

[25] Anderson (1977).

time. Genesis' 7-day week, for instance, stemmed from eighth- and ninth-century BC Babylonian astronomy.[26] Further, the author drawed upon images and literary structures from commonly known ancient Near Eastern cosmologies—such as *Enuma Elish*, *Atrahasis*, and *Gilgamesh*[27]—and, thus, provided a counter-cultural response in light of Israel's experience of God. Students who often struggle to let go of a literal interpretation seem to appreciate knowing that the Genesis account was written out of a unique Hebraic experience of God, as the author wanted to distinguish this God from the gods of these ancient cosmologies. Additionally, the text may address the existential questioning of exiled sixth-century BC Israelites: Can one still believe that the Creator who made an orderly, "very good" (Gen 1:31) universe directs one's future, even in exile?[28] Contextualizing Genesis 1 reveals the text's richness, not to mention posing a serious challenge to students' literalist interpretations of the 6 days of creation. The goal, in part, is for students to determine that taking a literal stance is "something that the ancient authors of Genesis, with their tolerance of versions, would never have done".[29]

Contextualizing Genesis 1 in this manner reverses many student concerns. Instead of regarding Genesis as outdated by science, the text takes on greater religious and cultural importance. It also can encapsulate personal spiritual significance for students, confirming the sacred order of life that scientific thinking need not discard. Theologically speaking, God the Creator is considered as engaging creation since its origins, thus challenging a semi-deistic presentation that is often assumed from Genesis 1.[30] Instead of envisioning creation as reality arriving as a *fait accompli*, this perspective develops richer theological thinking among students about God's involvement in the world—as found in Psalm 104. Creation is not a one-time event, but is the journeying of humankind and the entire universe toward its fulfillment.

3.3 What will be the universe's end?

Because Big Bang cosmology announces the universe's beginning, students' concerns often turn naturally to the end of time and scientific hypotheses about possible final endings of the cosmos. These include the universe expanding and contracting *ad infinitum* (i.e., the oscillating model), cycling through an unending number of crunches and explosions (i.e., string theory), or reaching a point of entropy where it runs out of energy (i.e., "heat death").[31] Scientist and theologian Peacocke reflects on the starkness of these destructive accounts and concludes that "the apocalyptic character of the scientific end, both of the Earth and of the universe, is far more bizarre and dramatic" than anything proposed in the Bible.[32] These possible endings can challenge the very meaning of human life, as people (obviously) situate themselves within the reality of the physical universe. These predictions of the universe's last breath, in effect, offer a cold ending seemingly devoid of hope.

For Christians, the end of creation calls into question God's purpose for creating a good world, as depicted in Genesis 1. Building upon a hope-filled reading of the 6 days of

[26] Falk (1999).

[27] Clifford (1994, pp. 74–95 and pp. 138–149).

[28] Lane (1996, p. 179).

[29] Clifford (1990, pp. 8–9).

[30] Lane (1996, p. 177).

[31] Trefil (2008, p. 183).

[32] Peacocke (2004, p. 329).

creation, students find insight by grappling with New Testament passages about the end of the physical world. Specifically, a creation-based eschatology considers the fate of all creation in the light of faith. Theologian and educator Lane presents early Pauline Christologies that reflect the wisdom tradition of the Old Testament and reveal a creation-centered perspective that establishes Christ as the centerpiece of God's plan for creation.[33] As depicted in the Letter to the Colossians, "[Christ] is first born of all creation; for in him all things in heaven and on Earth were created, things visible and invisible…all things have been created through him and for him…and in him all things hold together" (Col 1:15–17).[34] The Letter to the Ephesians underlines the plan of God "set forth in Christ, as a plan for the fullness of time, to gather up all things in him, things in heaven and things on Earth" (Eph 1:9–10). Lane argues that these early Christologies reflect the theme of Christ as that Wisdom which has a "creative, caring and ordering role within creation,"[35] as also found in 1 Corinthians 1:23–24 and Philippians 2:10–11. Pointing to the Christological titles of Jesus as Lord and Jesus as Logos (Word) leads Lane to emphasize the importance of the prologue in John's gospel: "In the beginning was the Word…all things came into being through him, and without him not one thing came into being" (Jn 1:1–3). Reflecting on Genesis 1:1, God's Word creates all things. Although the New Testament texts are not lengthy creation accounts like those found in the Old Testament, they remain significant. Several different books and letters in the New Testament present an early Christology that is centered on creation. In fact, Lane concludes that there is a "clear connection between creation and Christ [which] signals a real appreciation of the cosmic Christ within early Christianity."[36] Whereas modern cosmologies can conclude with a cold ending to all things, Lane comments that an understanding of the Creator as continuously bringing about and sustaining the universe places things in a different light.[37]

If students have a general weak grasp of creation, it is perhaps at its worst when understanding this more complex christological charactor of the Creator. Being unaware of biblical teaching linking Christ's work of salvation to the physical universe leads students to an anthropocentric vision of salvation. Eschatology—i.e., a future-looking vision of salvation—becomes understood as simply an escape from the Earth at the end of one's life, as if the physical world had no value. This is captured, for instance, in the almost unprecedented success of the Christian-based series *Left Behind*.[38] Examining these Christologies, however, opens a new vista for understanding Christian salvation, challenging students to consider a message of hope and purpose for the physical world and its continuing journey. Religious meaning then can converge to some extent with scientific knowledge. The Genesis 1 teaching on the goodness of creation, therefore, is upheld. Some scientists may predict a destructive end to the universe, but this fate falls within Christ's plans "to gather up all things" (Eph 1:9–10).

This hopeful message leads well into students consideration of their responsibility toward the destruction of the planet.

[33] Lane (1996, p. 184).

[34] Lane (1991, pp. 151–152).

[35] Lane (1996, p. 185).

[36] Lane (1996, p. 185).

[37] Lane (1996, p. 156).

[38] LaHaye and Jenkins (1995).

3.4 Why should I care about the Earth?

Science is clear: human beings are detrimentally affecting the Earth's climate. A 2014 United Nations report on climate change states that the "warming of the climate system is unequivocal" based upon warming of the atmosphere and ocean, rising of sea levels, and other significant factors.[39] The connection between human action and the worsening of Earth's climate is cause for serious concern and requires lifestyle changes within societies.

The majority of undergraduate students in my classes accept that human actions negatively affect the environment, as also found by Wachholz et al. (2014). What is often needed however, as pointed out by Sinatra et al. (2012), is a change in attitude that can empower environmentally-responsible behaviors amidst cynicism toward the difference one person can actually make with a change in lifestyle. From a religious point of view, climate change antiquates biblical teaching since many students question how an ancient teaching can address a modern crisis. Many scriptural texts underline the unity of creation and thus emphasize the human-Earth interdependence captured in contemporary ecology. To begin, it is insightful to examine Genesis 2:7 and the creation of the first human being from the clay of the Earth. The biblical author uses a word play in the text, where *'ādām* takes shape from the *'ădāmâ*, underscoring the belief that God creates the earthling from the Earth.[40] Thus, this first human being is best understood as an "earth-creature," "earthling," or "groundling." Biblical scholar Claus Westermann notes that the image of the human being made from the Earth frequently occurs throughout the Old Testament (e.g., Gn 3:19; Job 10:8–9; Ps 90:3 and 103:14) and concludes that these references infer that "the creation of human beings from the Earth or the clay was widespread and known at all times."[41] Apparently, the biblical author of Genesis—along with other ancients—had the central intention of drawing the connection between humans and the Earth they inhabit.

Some contemporary writers express this same connection with science-inspired metaphors. The writings of Peacocke and Sagan respectively speak of human beings as "part of the world [which] has become conscious of itself" and "the local embodiment of a cosmos grown to self-awareness."[42] Polkinghorne, drawing upon the theory that the origins of carbon stem from the end of the first generation of stars, concludes poetically that: "We are all made of the ashes of dead stars."[43] These cosmological descriptions and the Genesis text testify to a similar vision: the human being is "embodied self-consciousness" that does not own the Earth but rather belongs to it.[44]

Support for the universe's interrelatedness can be found elsewhere in the Bible. For instance, Paul's Letter to the Romans proclaims: "We know that the whole creation has been groaning in labor pains until now; and not only the creation, but we ourselves…groan inwardly while we wait for adoption, the redemption of our bodies" (Rm 8.19, 22–23). Supported by St. Paul's eschatological expectation, theologian Santmire argues how the ecological sufferings currently endured by the Earth are, in part, the cause for its groaning,

[39] United Nations Climate Summit (2014).

[40] Clifford (1991, p. 202).

[41] Westermann (1994, p. 204).

[42] Peacocke (1986, p. 91), Sagan (1980, p. 286).

[43] Polkinghorne (1986, p. 56).

[44] Lane (1996, p. 183).

which further stirs anticipation for a new heaven and new Earth.[45] There appears to be a causal link between humanity and creation. Ecological destruction affects humankind.

In my teaching experience, the majority of my students are unfamiliar with a biblical environmental ethic, especially one inclusive of eschatology, even though religious affiliation has been positively correlated with environmentally responsible behaviors of undergraduates.[46] It is one thing to consider the Earth as a gift from God, however, and another to consider the ecological crisis as the Earth groaning for its rebirth as a new creation. This creation-based eschatology overcomes the tendency to view creation as a gift from the past. While shifting emphasis away from a semi-deistic Creator, this thought calls for serious moral reflection since creation undergoes ongoing changes. In considering the causal connection between the destructive actions of human beings and the groaning of creation, students are challenged to examine their own lifestyles both individually and societally. Theological insights can inform and guide students' responses to climate change. A synergy between scientific findings and creation beliefs develops, inspiring action amidst commonly found cynicism toward environmental change.

4 Conclusion

Teaching about creation in terms of these larger life questions is academically challenging, but is meaningful for students. Engaging modern science through ancient creation texts brings a theological topic to life. Students critically engage biblical accounts in such a way as to support scientific findings and thus shape a more integrated view of human reality. Further, a biblical theology of creation is no longer limited to the origins of the universe but inclusive of evolutionary developments, eschatological wonderings, and an environmental ethic. As a result, ancient stories and beliefs about creation can be meaningfully integrated in contemporary education.

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[45] Santmire (1985, p. 202).

[46] Fusco et al. (2012).

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