

The Science–Faith Relationship and Its Impact on Students in Australian Christian Secondary Schools

Katherine Bensted

DipT, GradDipTheolEd, GradCertResMeth, MEd, PhD

Katherine Bensted is a registered teacher in Queensland and South Australia. She taught in Queensland state primary schools for almost a decade and was self-employed in the electrical contracting industry for another decade. Katherine graduated from the University of Divinity in March 2017. Her PhD dissertation is entitled *Christianity and Science in Australian Lutheran Secondary Schools: Perceptions, Problems and Possibilities*.

Abstract

This article is based on doctoral research undertaken by the author to investigate perceptions of the science–faith relationship within Lutheran secondary schools and the associated attitudes towards both science and Christianity. A variety of perspectives emerged including atheism, scientism and Young Earth Creationism. Creationism and scientism were found to be associated with negative student attitudes towards either science or Christianity, or both. The findings of the research emphasise the necessity for Christian school educators and administrators to be well-informed on the topic of the science–faith relationship and aware of the learning and attitudinal outcomes associated with different ideologies and approaches. The author's PhD dissertation, entitled *Christianity and Science in Australian Lutheran Secondary Schools: Perceptions, Problems and Possibilities*, was accepted by the Academic Board of the University of Divinity, Melbourne in February, 2017.

Keywords

science–faith relationship, evolution, creation, complementary model, independence model, conflict model, Young Earth Creationism, atheism, scientism, Christian schools, mission, attitudes, cognitive dissonance

Introduction

The way the science–faith relationship is perceived and explained within Christian schools has significant ramifications for the aims of Christian education, the mission of the church, and the education and career choices of students. The attitudes students develop towards both Christianity and modern science have an impact on the future availability of science teachers who are Christians and the representation of Christians in the scientific community. Motivated by a concern for young people's faith formation and the future of Christian and science education, I conducted research within Lutheran secondary schools to begin an exploration into the perceptions of the science–faith relationship and the attitudes towards both

Christianity and science that are held by students, science teachers and Christian Studies teachers.

The science–faith relationship continues to be a controversial topic within many Christian schools. For example, the religiously pluralistic demographic of Lutheran schools and their responsibilities, obligations, aims and challenges with regard to providing both science and Christian education are factors that have led to the recent publication of the Lutheran Education Australia (LEA) position paper: *Diverse Views on Science and Faith within Lutheran School Communities*.¹ The preamble to this paper states that "Lutheran Education Australia does not have an official position on the science and faith relationship." Significantly, educators in Lutheran schools are reminded that "Lutheran schools do not determine their own theological position on issues such as the relationship between science and faith but work under the publicly stated theological positions of the LCA [Lutheran Church of Australia]."² The implementation guidelines given in the LEA position paper explain that the LCA neither endorses nor rejects the scientific theory of evolution, but rejects intentionally anti-Christian interpretations of evolution. Despite the challenges involved in conducting research in schools, particularly research concerning a topic as controversial as the science–faith relationship, it is useful for the mission and aims of the Christian church and Christian education to develop an understanding of how the science–faith relationship is presented to and understood by young people, and how their perceptions impact on their attitudes towards both Christianity and science.

The research that was conducted within Lutheran secondary schools addressed key questions concerning students' perceptions of the science–faith relationship. Do theories contained within the Australian science curriculum correlate or conflict with Christian beliefs in the minds of students? How do the perceptions young people have of the science–faith relationship influence their attitudes towards both Christianity and science? How do adolescent Christians incorporate their knowledge of science and their Christian beliefs in their personal understanding of reality? At the heart of the research project is the science–theology dialogue; in particular, how this occurs within Christian educational institutions. It was anticipated that the research could create a platform of initial data, produce further research questions, and upon critique help to refine the approach for future theological research.

Researchers and authors typically use three models of the science–faith relationship to condense the various stances Christians take towards modern scientific theories. The three models are commonly known as the conflict model, the independence model, and the complementary model.³ These three models will be outlined prior to a

¹ Lutheran Education Australia, *Diverse Views on Science and Faith within Lutheran School Communities* (Adelaide: Lutheran Education Australia, 2016).

² Lutheran Education Australia, *Diverse Views on Science and Faith within Lutheran School Communities*, 1. Refer to Lutheran Church of Australia, "The Theses of Agreement and Inerrancy," in *Doctrinal Statements and Theological Opinions of the Lutheran Church of Australia*, rev. 3rd ed. (Adelaide: Lutheran Publishing House, 1989), B1– B5.

³ Authors who discuss models of the science–faith relationship include Ian G. Barbour, *Religion in an Age of Science* (London: SCM Press, 1990); Mikael Stenmark, "Ways of Relating Science and Religion," in *The Cambridge Companion*

description of the research approach and a discussion on the research findings. The purpose of this paper is to highlight the impact of different perceptions of the science–faith relationship on secondary students' attitudes in Christian schools. Therefore, the research results and findings that pertain to the students will be given greater attention than those of the teachers.

Conflict Model

The conflict view of the relationship between modern science and faith is often perpetuated by both Young Earth Creationists and atheists. Young Earth Creationists typically contend that the Genesis creation accounts are a factual and historical record of the origin of the universe and life on earth.⁴ Modern scientific theories such as Big Bang cosmology, macroevolution and common descent are typically rejected while alternate explanations are given that are founded on two major events of divine action—*creatio originans* (which they refer to as *creatio ex nihilo*) and a global flood.⁵ Atheists often promote the principles of scientism which is "the view that science reveals everything there is to know about reality ... all genuine (in contrast to apparent) knowledge must either be scientific or at least be reducible to scientific knowledge."⁶ Scientism broadens the scope of science to include all kinds of questions in an effort to replace ethics and religion. Well known advocates of scientism include the 'New Atheists' Richard Dawkins, Sam Harris, Daniel Dennett, and the late Christopher Hitchens.⁷ Young Earth Creationists and atheists

to Science and Religion. ed. Peter Harrison (Cambridge: Cambridge University Press, 2010) and *How to Relate Science and Religion: A Multidimensional Model* (Grand Rapids: William B. Eerdmans, 2004); Ted Peters and Martinez Hewlett, *Evolution from Creation to New Creation: Conflict, Conversation, and Convergence* (Nashville: Abingdon Press, 2003), Mark William Worthing, *God, Creation, and Contemporary Physics* (Minneapolis, MN: Augsburg Fortress, 1996); Kyle C. Longest and Christian Smith, "Conflicting or Compatible: Beliefs about Religion and Science among Emerging Adults in the United States," *Sociological Forum* 26, no. 4 (December 2011).

⁴ Ken Ham is the most widely known contemporary creation evangelist promoting Young Earth Creationism, mainly through publications and broadcasts aimed at popular culture (e.g. *Answers in Genesis* magazines, video and DVD recordings and radio programs).

⁵ Ken Ham, Jonathan Sarfati, and Carl Wieland, *The Updated and Expanded Answers Book: The 20 Most-asked Questions about Creation, Evolution, and the Book of Genesis Answered!* ed. Don Batten (Brisbane: Triune Press, 1999). This book outlines and explains the beliefs of Young Earth Creationism. It only discusses *creatio ex nihilo* and does not mention *creatio continua* or *creatio originans*.

⁶ Mikael Stenmark, "Scientism," in *Encyclopedia of Science and Religion*, ed. J. Wentzel Vrede van Huyssteen (Farmington Hills, MI: GALE Cengage Learning, 2003), 2:783.

⁷ Richard Dawkins, *The God Delusion* (Boston: Houghton Mifflin, 2008), 189, 389; Christopher Hitchens, *god is not Great: How Religion Poisons Everything* (New York, NY: Twelve, Hachette Book Group, 2007), 282–283; Robert B. Stewart, ed., *The Future of Atheism: Alister McGrath and Daniel Dennett in Dialogue* (Minneapolis: Fortress, 2008), 18–26.

both reinforce the other's perspective and as a consequence promulgate the view that science and faith conflict. This can occur within Christian school communities when Young Earth Creationist and atheist teachers present their personal views during class discussions.

Independence Model

Proponents of the independence model contend that Christian theology and science are completely separate fields and do not conflict, provided the parameters of each field are strictly defined and observed. The "non-overlapping magisteria" view of science and religion is credited to the scientist Stephen J. Gould, though as he states: "I present nothing original in stating the basic thesis ... for my argument follows a strong consensus accepted for decades by leading scientific and religious thinkers alike."⁸ The independence model dates back to Medieval Europe when various academic disciplines, distinct from theology, arose as universities developed from this time. In order to resolve tensions between university faculties and to establish the "independence and integrity of each discipline" Sir Francis Bacon insisted on the separation of God's 'two books,' the book of nature and the Bible.⁹ In their publication entitled *Science and Creationism* the National Academy of Sciences in the United States of America advocates the independence model in response to controversies surrounding the teaching of evolution in U.S. schools. This publication aims to refute the objections made by those who view evolution as contradictory to the "account of origins given in the first two chapters of Genesis" and who argue that "creation science" should be taught alongside evolutionary theory as "two alternative scientific theories."¹⁰ The idea that science and theology must be kept strictly separate indicates that the independence model fundamentally presupposes conflict between science and faith.

Complementary Model

There are many contemporary theologians and scientists who aim to advance the human understanding of reality by developing a shared understanding, or a "hypothetical consonance," between science and faith.¹¹ In contrast to the warfare imagery of the conflict model, the complementary model portrays science and theology as peaceful conversation partners. The complementary model covers a broad range of philosophical approaches that endeavour to maintain the philosophical scope and methodological integrity of the disciplines of the natural sciences and Christian theology, while seeking areas of similarity or overlap, or even

⁸ Stephen Jay Gould, *Rocks of Ages: Science and Religion in the Fullness of Life* (New York: The Ballantine Publishing Group, 1999), 52–59.

⁹ Mark Worthing, "Science and Theology: A Brief History," in *God and Science in Classroom and Pulpit*, ed. Graham Buxton, Chris Mulherin and Mark Worthing (Preston, VIC: Mosaic Press, 2012), 88–89.

¹⁰ National Academy of Sciences, *Science and Creationism: A View from the National Academy of Sciences*, 2nd ed. (Washington DC: National Academy Press, 1999), ix.

¹¹ Ted Peters, "Science and Theology: Toward Consonance" in *Science and Theology: The New Consonance*, ed. Ted Peters (Boulder, Colorado: Westview Press, 1998), 12.

a synthesis of scientific knowledge and theological understanding. Each of the natural sciences presents questions, explanations, terminology, concepts, methods and practices; any or all of which may be points of contact between science and theology. Exploring possibilities for consonance involves some risk-taking; however, the potential for mutual benefit and enrichment inspires many to take up the challenge.¹² Many theologians who engage in the science–faith dialogue endorse the view that theology and science share the common aim of describing reality and share common methods of doing so.¹³ They include Philip Clayton,¹⁴ Ted Peters,¹⁵ Mark Worthing,¹⁶ Denis Edwards¹⁷ and Alister McGrath,¹⁸ all of whom discuss biblical and scientific eschatology and concepts such as emergence or continuous creation in a dynamic universe.

Research Approach

Three overarching questions drove the survey and interview components of the research project conducted within Australian Lutheran secondary schools:

- What is the prevalence of each of the three models of the science–faith relationship within the context of Australian Lutheran secondary schools?
- What is the impact that the adopted model or models have upon the perceptions and attitudes of science teachers, Christian Studies teachers, and students concerning the nature and purpose of science and Christian theology, and the relationship of the two?
- To what extent does each model of the science–faith relationship (relative to the other models) foster positive attitudes towards Christianity and modern empirical science, and adhere to Lutheran theological principles?

A pragmatic mixed methods approach was employed to find answers to these questions and to clearly portray the attitudes and beliefs held by the study participants. Quantitative data was collected using an online survey instrument developed by the researcher (the author of this article). Qualitative data was obtained through one-to-one interviews administered by the researcher who adhered to a standard protocol to maintain the validity and reliability of the qualitative data.

¹²Ian Barbour, "Science and Religion, Models and Relations," in *Encyclopedia of Science and Religion*, ed. J. Wentzel Vrede van Huyssteen (Farmington Hills, MI: GALE Cengage Learning, 2003), 762; Alister McGrath, *Science and Religion: A New Introduction*, 2nd ed. (Chichester, West Sussex: Wiley-Blackwell, 2010), 2.

¹³ John Kekes, *The Nature of Philosophy* (London: Basil Blackwell, 1980), 155.

¹⁴ Philip Clayton, *The Problem of God in Modern Thought* (Grand Rapids, MI: William B. Eerdmans Publishing Company, 2000), 37–38, 425–426; Alister McGrath, *Science and Religion*, 229. Clayton focussed on the notion of "inference to the best explanation."

¹⁵ Peters and Hewlett, *Evolution from Creation to New Creation*, 22, 28, 162.

¹⁶ Worthing, *God, Creation, and Contemporary Physics*, 31–32, 115, 160–162, 174–175.

¹⁷ Denis Edwards, *Jesus and the Cosmos* (Homebush, NSW: St Paul Publications, 1991), 18, 104, 134; Denis Edwards, *How God Acts: Creation, Redemption and Special Divine Action* (Hindmarsh, SA: ATF Press, 1989), 153.

¹⁸ McGrath, *Science and Religion*, 57, 102–108, 111, 134.

For this research the quantitative data took precedence in answering the research questions and qualitative data was collected to provide authentic examples and meaningful, personal explanations.

The online survey consisted of 68 items. Twenty-four items collected non-identifying demographic data. Two items were short-answer questions concerning factors that contributed to change in the participants' perspectives on the science–faith relationship. One item required the respondents to select the science–faith model they thought best described their personal perspective. Forty-one items were statements designed to indicate viewpoints regarding eight broad concepts derived from the three overarching research questions. The eight concepts were: the conflict model, the independence model, the complementary model, scientism, creationism, common myths surrounding the science–faith relationship, attitudes towards Christianity, and attitudes towards science.

A four-point Likert scale was utilised (without a neutral option) to produce clear and conclusive data. Survey statements were analysed individually and collectively under each of the eight broad concepts according to the frequency and weighting of the responses. A preponderance of consistent responses for a concept was interpreted as indicating a strong leaning towards a particular belief. For example, a minimum of three affirmative responses to the four statements regarding a specific model of the science–faith relationship indicated the respondent subscribed to that model. Consistent responses to secondary questions provided confirmation of such interpretations.

Separate sets of interview questions were prepared for the three types of participants: the Christian Studies (CS) teachers, the science teachers and the students. The interviews consisted of six to eight short, open-ended questions to allow the participants opportunity for self-expression. The questions addressed teaching guidelines, challenges, pedagogical approaches, attitudes and influential factors with regard to the science–faith relationship within the context of Lutheran secondary schools.

The ideas and questions used in the data collection instruments were drawn from academic literature on the science–faith relationship and the overarching questions driving the research. The survey statements were based on common definitions used to explain various concepts in the literature. A process of trialling, revising and refining the statements and questions used in the survey and interviews preceded the study so that the ideas were expressed as simply and clearly as possible without loss of meaning or integrity.

Initial approval for the research was sought from the national and district heads of Lutheran Education Australia (LEA). All LEA secondary schools were invited to participate in the research project. Some of the schools that declined involvement in the study offered their reasons for not participating. The reasons were the demanding workload of staff and students, involvement in other research projects, and reticence to broach the subject of the science–faith relationship within their school community. Regarding the latter point, it seems that in some schools there were people who were reluctant to draw attention to the matter of science and faith in case this ignited or reignited tension within the school community. Thus, before the research began, there was an indication that a level of perceived conflict is

associated with the science–faith relationship within schools, that conflict is accepted as the status quo, and that there is a tendency for school leadership to avoid potential conflict in this area.

Participation in the research project was on a voluntary basis without encouragement or reward in accordance with the research guidelines. Controversy surrounding the science–faith relationship within an educational or religious institution has the potential to impact the level of voluntary participation in research conducted into this topic. Although the timeframe of the research was extended it proved very difficult to increase the sample size. Nevertheless, the level of participation was deemed adequate for the production of valid and reliable data. Among the schools that agreed to be involved in the research project 18 CS teachers, 20 science teachers and 82 students responded to the online survey. Three CS teachers, two science teachers and 11 secondary students volunteered to be interviewed in South Australian Lutheran secondary schools.

The respondents were permitted to nominate more than one category with regard to their religious affiliation. Eighty-nine responses were given by 79 students. Fifty-one responses (57 per cent) indicated Christian or a Christian denomination. Thirty-one per cent of responses indicated the “no religion” option. The four male respondents who selected the “other” option identified as one of the following: Taoism, Jedi, Jehovah’s Witness and Catholic. One of the two female respondents who selected the “other” option identified with three denominations (Uniting, Trinity and Lutheran), and the other stated “still exploring and learning.” The table below sets out the students’ responses.

Table 1. Religion of students

Religion	Lutheran	Anglican	Roman Catholic	Uniting	Baptist	Pentecostal/ Charismatic	Other Christian	Judaism	Islam	Buddhism	Hinduism	No religion	Other	Total
Male	16	2	3	1	1	-	-	-	2	1	-	12	4	42
Female	15	4	1	1	2	2	1	-	1	2	-	16	2	47
Total	31	6	4	2	3	2	1	-	3	3	-	28	6	89

Forty-four responses were given regarding the religious affiliation of the participating teachers. The CS teachers represented various Christian denominations, the largest being Lutheran. Various denominations of Christianity were nominated by more than three quarters of the science teachers. The two teachers who selected “other” both specified Christianity as their religion.

Table 2. Religion of teachers

Religion	Lutheran	Anglican	Roman Catholic	Uniting	Baptist	Pentecostal/Charismatic	Other Christian	Judaism	Islam	Buddhism	Hinduism	No religion	Other
Science teacher	4	2	4	1	4	1	1					5	1
CS teacher	11	1	1		2	4	1						1

At the beginning of data collection teachers were asked to nominate as being primarily either a science teacher or a CS teacher. It must be noted that those who nominated the science teacher category might also teach CS, especially if they identify as being Christians. Conversely, those who chose the CS teacher option might also teach science.

Students' Responses

Conflict Model

More than one half of the student respondents agreed that science and religion inevitably find themselves in conflict with each other (Statement 42). One third of the students thought learning about the theory of evolution could be harmful to a person's faith in God (Statement 43) and agreed with the claim that if evolution is true then the Bible must be wrong about the origins of life (Statement 44). One fifth of the student respondents thought that either science or theology must change its claims when there is conflict between the two (Statement 41). Almost two thirds of the students' responses were in disagreement with the four conflict view survey statements. It is interesting to note that students who strongly rejected statements indicative of the conflict model usually identified with a Christian denomination.

Table 3. Students and the conflict model

	Strongly Agree	Agree	Disagree	Strongly Disagree	Total Responses	Weighting
Statement 41	3	10	44	8	65	2.88
Statement 42	9	28	25	6	68	2.41
Statement 43	8	15	33	13	69	2.74
Statement 44	5	19	35	9	68	2.71
Total	25	72	137	36	270	2.69

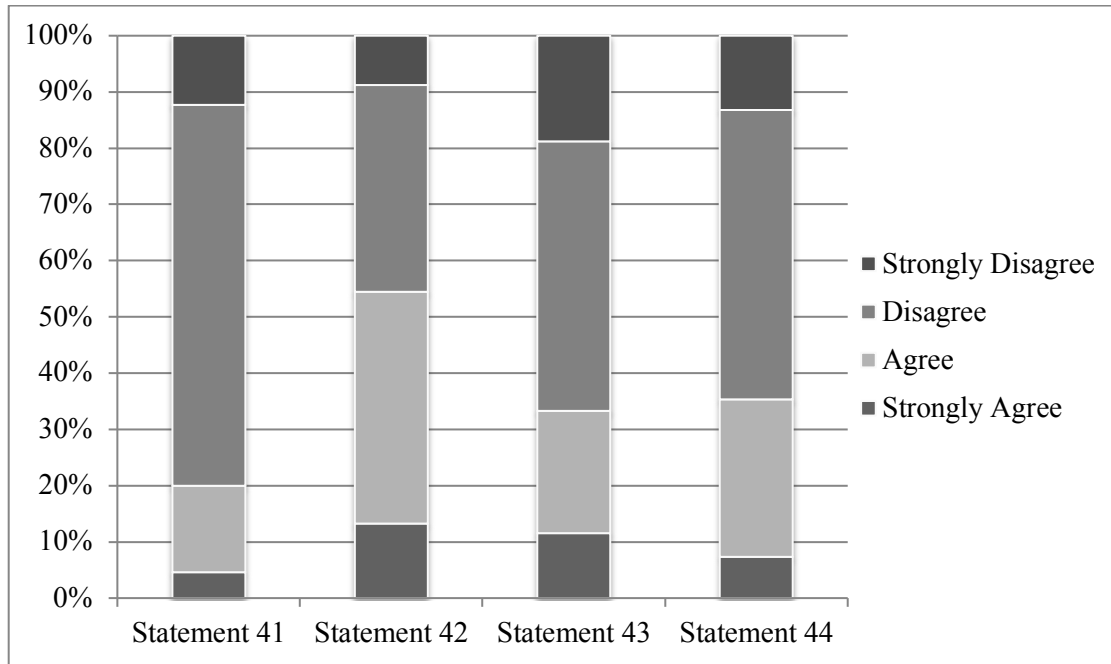


Figure 1. Students and the conflict model

When asked during an interview whether students viewed evolution and the Big Bang as contradictory to Christian beliefs a CS teacher made the following observation: “Yes ... they appear to be polarised. The views of students seem to be polarised ... they think it’s either one or the other. So in their head they’re mutually exclusive.” This teacher seemed concerned about Christian students and their understanding of the science–faith relationship: “I’ve not met a student that says I’m a Christian, but I’m coping with these other ways of explaining whatever’s happened to do with creation or whatever.” The effect that a polemical view of science and Christianity can have on students was discussed by another CS teacher:

I think more than contradictory, they just ... they don’t know where it [science] sits in terms of Christianity. They don’t necessarily understand how they work together. We often find that it’s really black and white—you’re either a Christian and believe in creationism or you are an atheist and you don’t, and you believe in evolution you know. They don’t ... they struggle to see a middle ground in that area. So primarily when the students are approaching it they get stuck in this dichotomy and sort of spin back and forth and can’t quite see the way forward.

It seems that at some point students learn that there are only two alternatives, creationism or atheism, and they are not aware of “a middle ground.” This is reflected in a student’s response to the question of how scientific theories affect his/her interest in Christian Studies:

I always get a bit confused about why people say there’s either one or the other between like God and science, so I always get interested when learning about science things to see how that could relate to what I believe. But I also don’t know how it does all the time, and so it would be just interesting to see what people think on that.

Confusion was expressed by another student: "I can see sometimes how they can relate—it just confuses me sometimes." One student answered, "A little bit, yeah, I guess. But it's not so much, 'cause I like ... it just explains a little bit. But I'm more like, I'm more, you know, focussing on what the Bible says as what science [says]." In light of these comments further exploration of the effects that a conflict view of science and faith has on students' attitudes towards both science and Christianity is warranted.

The data indicated that acceptance of the conflict model did not necessarily have a detrimental effect upon students' attitudes towards science. Three quarters of the responses provided by students who agreed with the conflict model statements were positive towards science. This was slightly more than those students who rejected the conflict model statements. On the other hand the conflict model appeared to have a negative impact overall on the attitudes of students towards Christianity. One half of the responses provided by students who agreed with the conflict model statements were positive towards Christianity. This was around four per cent less than those students who rejected the conflict model statements as shown in the following table:

Table 4. Conflict model and attitudes towards science and Christianity

Statement	Accepted or rejected	Attitudes towards science (positive/total responses)	%	Attitudes towards Christianity (positive/total responses)	%
41	Accepted	75/99	75.76	62/107	57.94
42	Accepted	216/287	75.26	158/313	50.48
43	Accepted	128/175	73.14	111/191	58.12
44	Accepted	141/182	77.47	72/200	36.00
41–44	Accepted	560/743	75.37	403/811	49.69
41	Rejected	300/401	74.82	223/437	51.03
42	Rejected	175/238	73.53	145/258	56.20
43	Rejected	259/357	72.55	191/387	49.35
44	Rejected	248/342	72.52	225/372	60.48
41–44	Rejected	982/1338	73.39	784/1454	53.92

Independence Model

More than one half of the students' responses indicated acceptance of the independence model of the science–faith relationship. Less than one half of student respondents affirmed the statement that the church need not re-examine its own teachings as a result of new scientific discoveries or theories as these do not touch upon spiritual realities (Statement 45). However, more than one half of student respondents thought that scientific theories and methods should not be influenced by Christian teachings (Statement 46). Almost two thirds of the students agreed that

there is no need to adapt scientific theories to Christian beliefs (Statement 47), and that there is no need to adapt Christian beliefs to scientific theories (Statement 48).

Table 5. Students and the independence model

	Strongly Agree	Agree	Disagree	Strongly Disagree	Total Responses	Weighting
Statement 45	8	21	29	7	65	2.54
Statement 46	11	26	23	6	66	2.36
Statement 47	10	33	17	6	66	2.29
Statement 48	14	28	23	2	67	2.19
Total	43	108	92	21	264	2.35

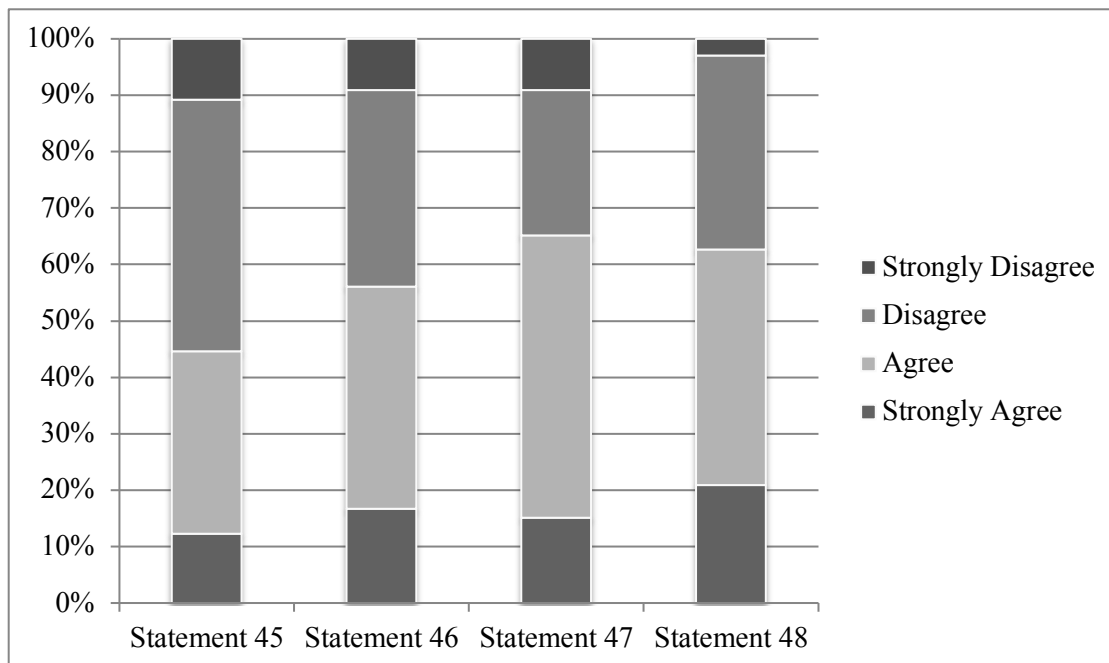


Figure 2. Students and the independence model

Further analysis showed that the students who accepted the independence model statements were more likely to agree with scientism and common myths of the science–faith relationship than those who rejected the independence model statements. The data indicated that students who accepted the independence model statements were more positive towards science (by 18 per cent overall) than those students who rejected the four statements. Interestingly, the students who accepted the independence model statements were also more positive towards Christianity than those students who rejected the four statements. Fifty-seven per cent of the responses provided by students who agreed with the independence model statements were positive towards Christianity. This was 13 per cent more than those students who rejected the independence model statements.

Table 6. Independence model and attitudes towards science and Christianity

Statement	Accepted or rejected	Attitudes towards science (positive/total responses)	%	Attitudes towards Christianity (positive/total responses)	%
45	Accepted	162/218	74.31	137/236	58.05
46	Accepted	243/281	86.48	159/304	52.30
47	Accepted	284/329	86.32	206/355	58.03
48	Accepted	267/322	82.92	211/347	60.81
45–48	Accepted	956/1150	83.13	713/1242	57.41
45	Rejected	209/282	74.11	149/311	47.91
46	Rejected	141/227	62.11	127/249	51.00
47	Rejected	100/179	55.87	79/199	39.70
48	Rejected	122/194	62.89	80/215	37.21
45–48	Rejected	572/882	64.86	435/974	44.66

During an interview a CS teacher expressed that more could be done to change the impression that students have of the science–faith relationship. This teacher made the observation that students are influenced by “the culture around them” which generally purports that religion and the sciences are “very separate.” This teacher identified two factors thought to contribute to students’ impressions of dissonance between scientific knowledge and Christian teachings. These were the separation or lack of interaction between the science and CS faculties in the school and an inconsistent approach to the science–faith topic. This CS teacher stated,

I think they kind of sit off and that’s where some of the confusion comes from ... is they sit in their own little worlds ... Christian Living teachers do their thing and science teachers do their things. And because they [the students] aren’t really getting necessarily a consistent message, I think that’s where some of the confusion comes from. I think we could do better and we do at Year 12 at exploring these types of things more. That being said, it’s not a huge issue for most students. Very few are up late at night thinking about it.¹⁹

According to another CS teacher’s comments CS teachers can be unacquainted with the Australian science curriculum. If this is the case, then it is quite possible that there are also science teachers who are unfamiliar with the CS curriculum. This particular CS teacher alluded to the separation of science and CS at school and assigned the topic of creation and evolution to the realm of science:

¹⁹ Christian Living is a school subject under the auspices of Christian Studies.

We don't specifically teach creation-evolution. I think this is more of a science question. I know that in science—I'm not sure what year level. I think though it is in SACE. It is mandated by SACE that evolution be taught. But that's not because I teach it. I just came across that fact. So I probably wouldn't be necessarily well qualified to answer how it's dealt with in the class because we don't specifically teach it. And so when we come across it it's just as a "by the way" or if a student brings it up, which is not—yeah. I've not really had to deal with it as such.

Similar observations of the separation of science and CS were made by several students. These comments can be summed up with one student's remark, "We don't really do that much in terms of discussing science in Christian Studies."

Complementary Model

Acceptance of the complementary view was a little stronger among students than that of the independence and conflict views. Sixty per cent of the students' responses supported the complementary view statements. Two thirds of the students accepted the idea that modern science and Christian theology can learn from and help each other (Statement 49) and that the natural sciences can add to our understanding of God through the study of God's creation (Statement 50). More than one half of the students accepted the idea that the Genesis creation accounts can be understood in a way that corresponds with modern scientific explanations (Statement 51). A similar proportion accepted the statement that scientific theories such as evolution and the Big Bang are compatible with Christian beliefs (Statement 52).

Table 7. Students and the complementary model

	Strongly Agree	Agree	Disagree	Strongly Disagree	Total Responses	Weighting
Statement 49	12	31	17	8	68	2.69
Statement 50	12	33	17	6	68	2.75
Statement 51	8	29	22	7	66	2.58
Statement 52	9	27	22	8	66	2.56
Total	41	120	78	29	268	2.65

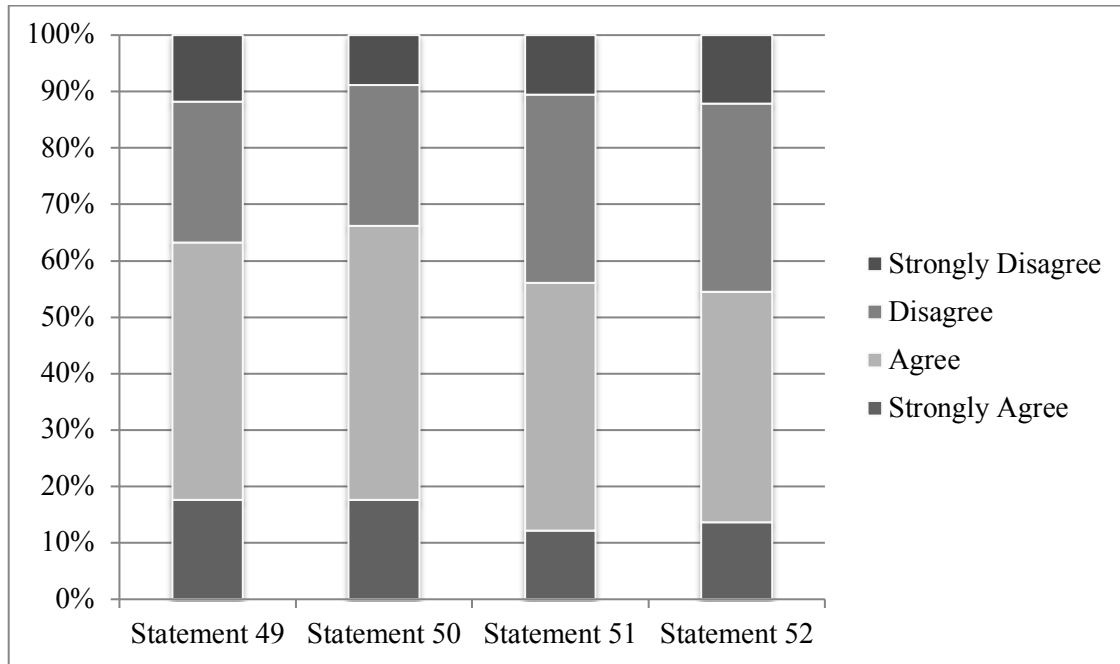


Figure 3. Students and the complementary model

In response to questions regarding evolution and the Big Bang some student interviewees expressed the way they perceive consonance between science and God’s creative activity in the world. One student remarked, “I believe in evolution. I think that the species have evolved dramatically over the years and—but I also believe that God had a part in that as well.” One student, when asked if the Big Bang was a reasonable way of describing the origin of the universe, replied, “I think it could have been because when God created everything there might have been a humungous bang that happened and the earth could have just formed like that. But it’s not exactly proven so.” On the topic of the Big Bang a student made the following comment: “I think personally, that as a Christian that if there is a God, then I don’t see why he can’t use the Big Bang to make the universe. Yeah, like obviously he could have just done it other ways, but I see no reason why the Big Bang — just I don’t think that the Big Bang just happened.” Another student commented, “I think that there has to be something else to it than just a Big Bang. I think God must have been involved in it somehow.”

The findings associated with Statements 49–52 support the summation that students who accept statements indicative of the complementary model tend to identify with Christianity, have positive attitudes towards science and Christianity, and reject scientism. The table below contrasts students who accepted Statements 49–52 with students who rejected these statements in terms of their attitudes towards science and Christianity.

Table 8. Complementary model and attitudes towards science and Christianity

Statement	Accepted or rejected	Attitudes towards science (positive/total responses)	%	Attitudes towards Christianity (positive/total responses)	%
49	Accepted	269/329	81.76	226/354	63.84
50	Accepted	286/345	82.90	238/373	63.81
51	Accepted	229/281	81.49	198/303	65.35
52	Accepted	225/273	82.42	187/296	63.18
49–52	Accepted	1009/1228	82.17	849/1326	64.03
49	Rejected	124/195	63.59	74/217	34.10
50	Rejected	107/179	59.78	62/198	31.31
51	Rejected	152/227	66.96	92/253	36.36
52	Rejected	155/235	65.96	102/261	39.08
49–52	Rejected	538/836	64.35	330/929	35.52

Students who accepted the statements indicative of the complementary model were more positive towards science providing 18 per cent more positive responses than those students who did not accept these statements. Students who accepted the statements indicative of the complementary model provided 29 per cent more positive responses towards Christianity than students who rejected these statements.

Attitudes towards Christianity and science

Nine statements were included in the on-line survey to indicate the students' attitudes towards Christianity. Four of these statements were accepted by the majority of students. More than one half of the respondents expressed an interest in learning about Christianity (Statement 53) and indicated that Christian teachings are useful and helpful in their lives (Statement 54). The suggestion that Christian organisations help people in various practical ways (Statement 55) was accepted by almost three quarters of the respondents. The claim that Christians can be successful science students at university (Statement 57) received the greatest support with 80 per cent of the responses. Less than one half of the respondents agreed that Christian beliefs and concepts challenge their thinking about many different topics apart from Christian faith (Statement 28) and thought that Christianity makes the world a better place to live in (Statement 56). One third of respondents, the weakest response to any of the statements concerning attitudes towards Christianity, thought that they would consider further studies in Christian theology (Statement 58). A little more than one third of the respondents agreed that their experience in Lutheran schools had encouraged them to continue learning about Christianity (Statement 59). A similar proportion thought that they would like to work in a Christian organisation (Statement 60).

Table 9. Students' attitudes towards Christianity

	Strongly Agree	Agree	Disagree	Strongly Disagree	Total Responses	Weighted Average
Statement 28	11	26	26	17	80	2.39
Statement 53	15	22	17	12	66	2.61
Statement 54	12	25	14	13	64	2.56
Statement 55	16	31	8	10	65	2.82
Statement 56	8	22	19	13	62	2.40
Statement 57	31	21	4	9	65	3.14
Statement 58	10	12	26	18	66	2.21
Statement 59	8	16	27	14	65	2.28
Statement 60	8	15	26	16	65	2.23
Total	119	190	167	122	598	2.52

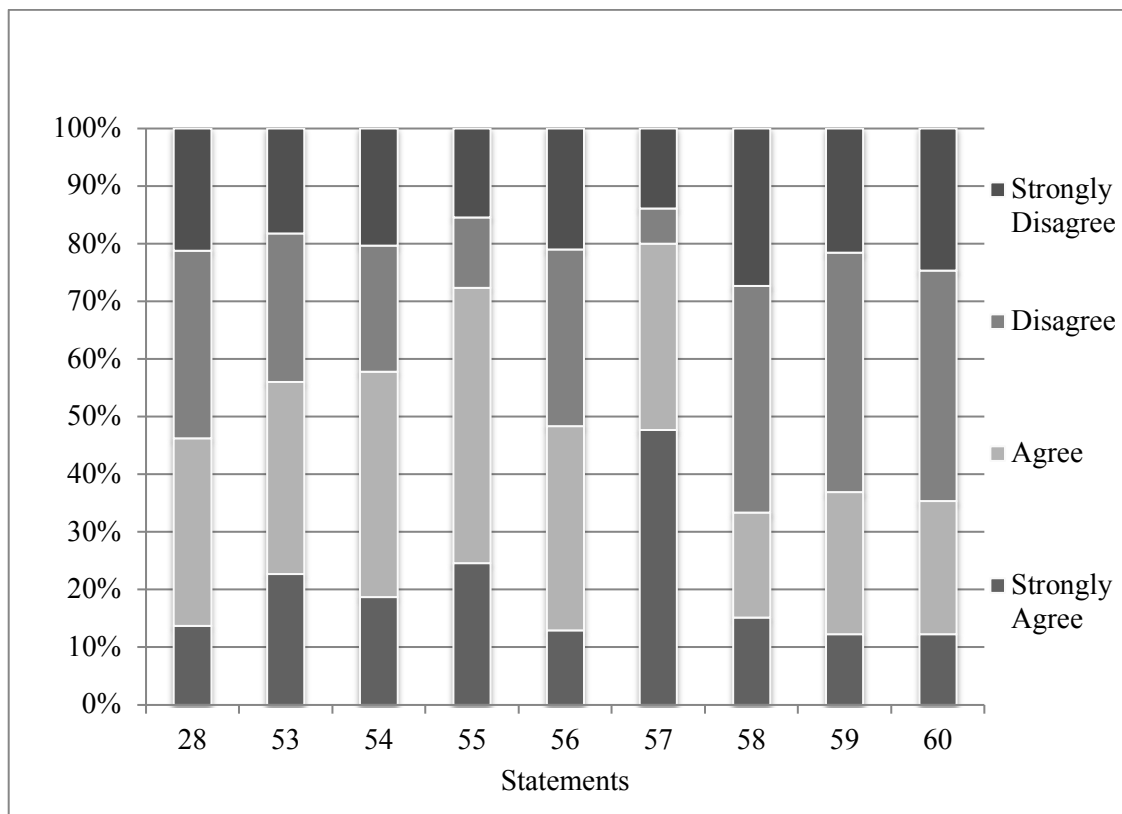


Figure 4. Students' attitudes towards Christianity

Eight statements were included in the survey to indicate the students' attitudes towards science. The idea that science helps us to understand the world we live in (Statement 62) received the strongest positive response (88 per cent). More than three quarters of the respondents expressed an interest in learning more about science (Statement 61) and a similar proportion of the respondents agreed that

science is generally making the world a better place (Statement 64). More than 80 per cent of the respondents agreed that science contributes to improving living standards for most people (Statement 63) and that it is important to study science at secondary school (Statement 65). Around seven in ten respondents thought that they would consider studying science at university (Statement 25) and that they would be happy with a career that involves science (Statement 26). However, the statement referring to the students' experiences in Lutheran schools as encouraging them to pursue further study and/or a career in science (Statement 27) was the only statement that did not receive a majority of positive responses (48 per cent).

Table 10. Students' attitudes to science

	Strongly Agree	Agree	Disagree	Strongly Disagree	Total Responses	Weighted Average
Statement 25	25	31	12	13	81	2.84
Statement 26	26	32	12	11	81	2.90
Statement 27	12	27	25	17	81	2.42
Statement 61	25	26	11	5	67	3.06
Statement 62	26	32	4	4	66	3.21
Statement 63	23	33	6	4	66	3.14
Statement 64	18	33	10	4	65	3.00
Statement 65	25	30	7	4	66	3.15
Total	180	244	87	62	573	2.97

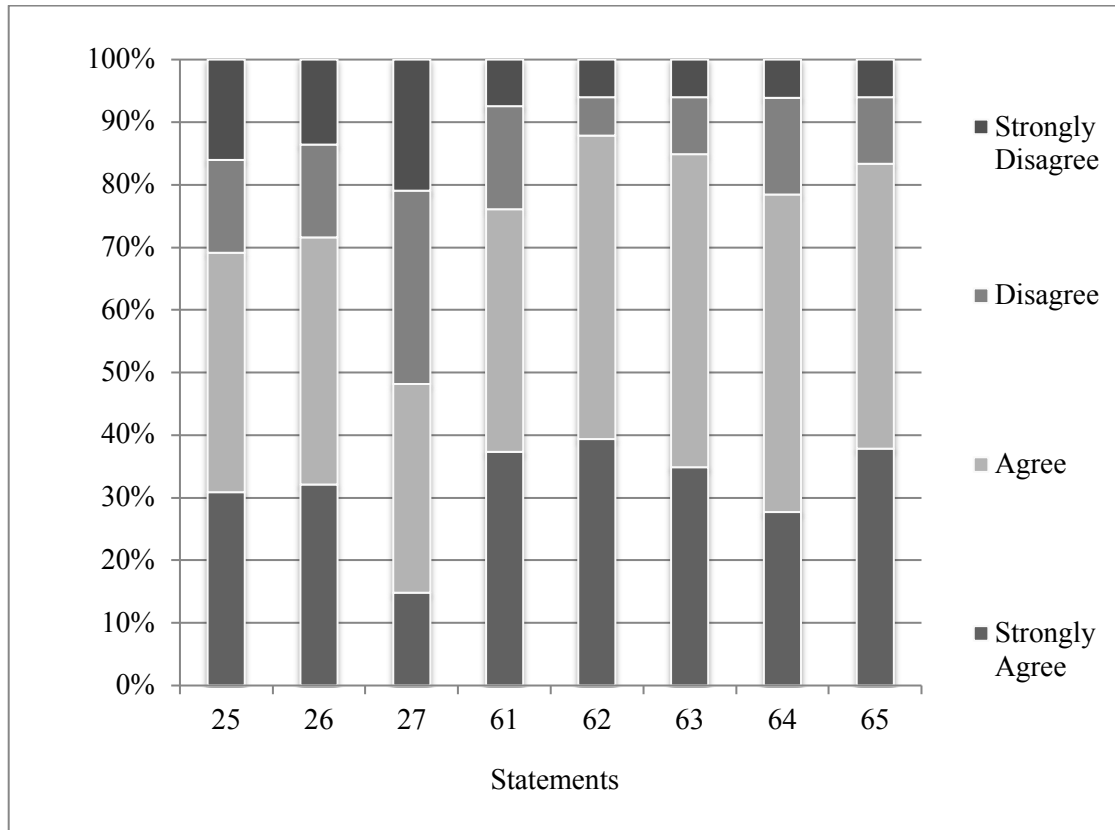


Figure 5. Students' attitudes towards science

Seventy-four per cent of students' responses were positive towards science, whereas 52 per cent of the students' responses were positive towards Christianity. The interviewed students' comments generally reflect the desire to be intellectually and actively engaged in their Christian education or formation. Two student responses highlight this point. One student commented that Christian Studies lessons are "horrible and boring" and that "we don't really look at anything that interesting. It's more just like personal reflection, which everyone hates." In contrast a student interviewee described science lessons as "pretty good." This student commented that, "Science lessons are interesting. It's fun. We learn interesting stuff about, y' know, how everything works and how everything is and it's just like I want to find out more about it."

The research indicated that the science–faith model adopted by students impacted on their attitudes towards both science and Christianity. Students who held a conflict view had the lowest score overall in terms of positive attitudes towards Christianity. Students who accepted the complementary view produced the highest score in terms of positive attitudes towards Christianity. Students who accepted the independence model were more positive towards science than students who accepted the other models. Students who accepted the complementary view had almost the same level of positive attitudes towards science as those who accepted the independence view. Students who rejected the complementary view statements produced the lowest score in terms of positivity towards both science and Christianity.

Students who generally accepted that science and faith inevitably conflict were found to be influenced by scientism, creationism, or even a combination of both

ideologies.²⁰ Students who held strong views in agreement with scientism and the conflict view generally had positive attitudes towards science, but were much less likely to have positive attitudes towards Christianity. There was reduced adherence to scientism and greater positivity towards both Christianity and science among students who accepted the independence model. The complementary approach had, by a large degree, the lowest rate of adherence to scientism while maintaining positive attitudes towards science, and the highest degree of positivity towards Christianity. The majority of students who rejected scientism perceived a complementary relationship between science and faith.

Scientism

Overall, the results indicated that scientism has a considerable influence upon the beliefs of students in Lutheran secondary schools. One half of the student respondents could be categorised as adherents to scientism. Forty-five per cent of the students' total responses were in agreement with the three statements used to indicate scientism.²¹ One quarter of the students accepted the strongest indicator of scientism; the proposition that people only need science and religion is not needed anymore (Statement 31). Further data analysis revealed that adherence to scientism was associated with three factors:

1. An acceptance of common myths surrounding the science–faith relationship;
2. A perceived conflict between, or the need to separate, science and faith; and
3. A lack of identification and involvement with, or knowledge of, religious faith; the Christian faith in particular.

Table 11. Scientism and students

	Strongly Agree	Agree	Disagree	Strongly Disagree	Total	Weighted Average
Statement 29	10	27	28	14	79	2.42
Statement 30	17	32	20	9	78	2.73
Statement 31	8	12	37	22	79	2.08
Total	35	71	85	45	236	2.41

²⁰ Students who adhered to the conflict model were also proponents of either scientism (83%) or creationism (17%).

²¹ Statement 29 - Science has proven that only the natural, material world is real.
Statement 30 - Science explains why the universe, life, and I exist.

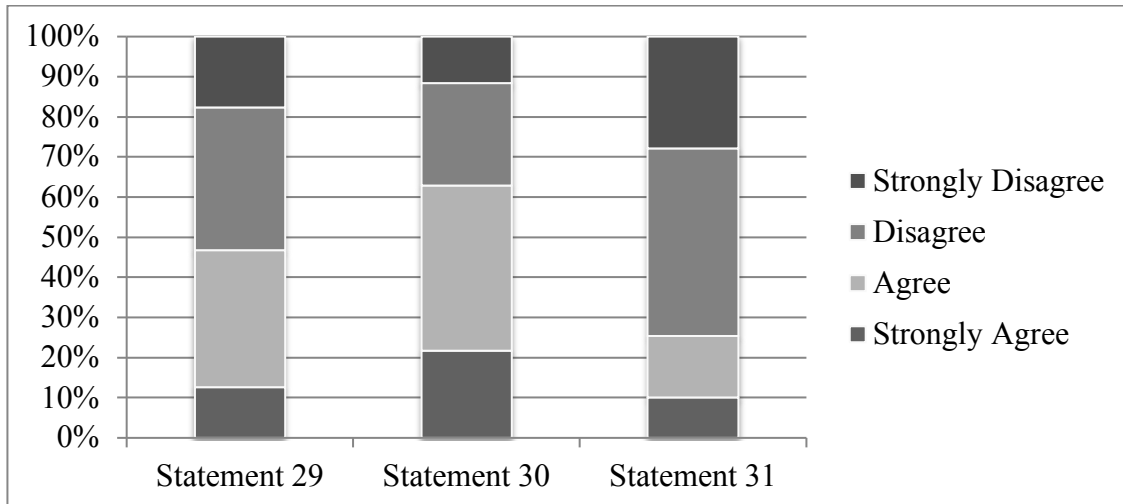


Figure 6. Scientism and students

Creationism

Almost 30 per cent of the student respondents could be categorised as adherents of creationism. Close to 85 per cent of students rejected the idea that biological evolution is false because it is not described in the biblical creation accounts (Statement 37). Two thirds of the students disagreed with the idea that the creation accounts in Genesis explain exactly the origins of the world (Statement 38) and that an accurate scientific theory of origins will correspond to the biblical creation accounts (Statement 40). Almost three quarters of the students' responses were in disagreement with Statements 37, 38 and 40. Nevertheless, almost two thirds of student respondents thought that creationism and Intelligent Design should be included in the science curriculum (Statement 39).

Table 12. Creationism and students

	Strongly Agree	Agree	Disagree	Strongly Disagree	Total	Weighting
Statement 37	4	7	42	20	73	3.07
Statement 38	6	18	32	18	74	2.84
Statement 39	13	34	23	5	75	2.27
Statement 40	4	23	37	9	73	2.7
Total	27	82	134	52	295	2.72

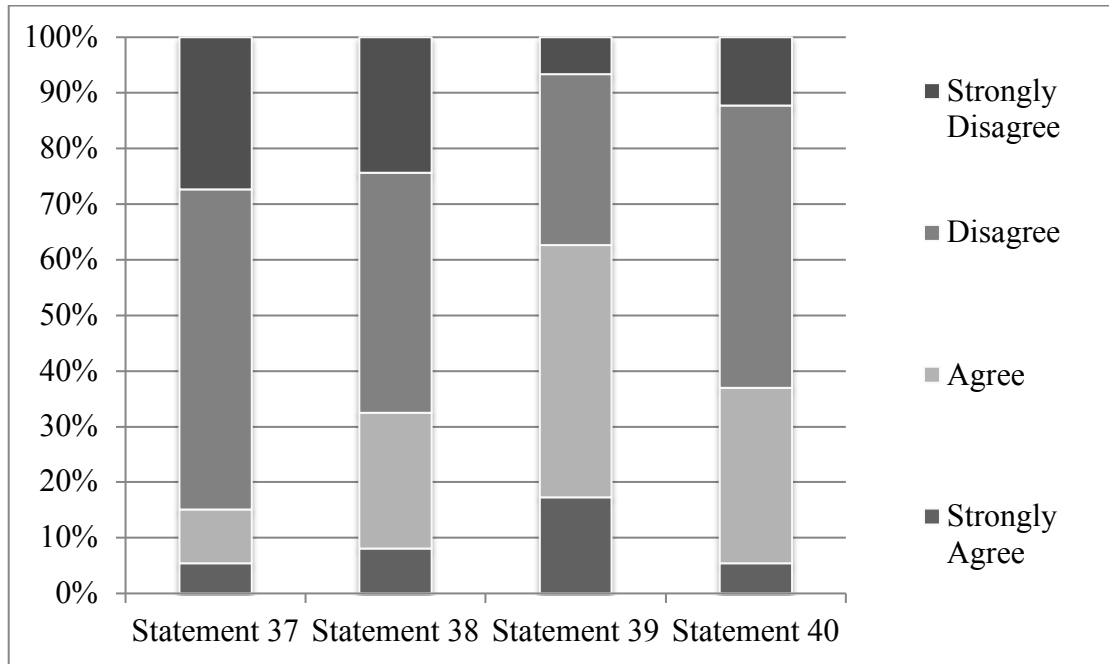


Figure 7. Creationism and students

The findings of this research are consistent with the results of studies conducted overseas. The impression given to students of the consonance or dissonance of various philosophical, scientific, and faith-based claims has significant consequences for their attitudes towards both Christianity and science.²² The importance of these studies for the mission of the church is highlighted by German researcher, Helmut Reich, who claims that the perception of incompatibility between religious and scientific worldviews is a major reason behind adolescents losing interest in religion.

²² For more information see the following: Josephine Egan and Leslie Francis, "Does Creationism Commend the Gospel? A Developmental Study among 11–17 Year Olds," *Religious Education* 87, no. 1 (Winter 1992); Jeff Astley and Leslie J. Francis, "Promoting Positive Attitudes towards Science and Religion among Sixth-form Pupils: Dealing with Scientism and Creationism," *British Journal of Religious Education* Vol. 32, no. 3 (2010); Leslie J. Francis, Harry M. Gibson and Peter Fulljames, "Attitude towards Christianity, Creationism, Scientism and Interest in Science Among 11–15 Year Olds," *British Journal of Religious Education* 13, no. 1 (Autumn 1990); Trevor Cooling, "Science and Religious Education—Conflict or Co-operation?" *British Journal of Religious Education* 13, no.1 (Autumn 1990); Jeff Astley, "The Science and Religion Interface within Attitudes and Beliefs," in *Religion, Education and Adolescence: International Empirical Perspectives*, ed. Leslie J. Francis, Mandy Robbins and Jeff Astley (Cardiff: University of Wales Press, 2005); Kyle C. Longest and Christian Smith, "Conflicting or Compatible: Beliefs about Religion and Science among Emerging Adults in the United States," *Sociological Forum* 26, no. 4 (December 2011); Michael Mason, Andrew Singleton and Ruth Webber, *The Spirit of Generation Y: Young People's Spirituality in a Changing Australia* (Mulgrave, Victoria: John Garratt Publishing, 2007).

He says that the achievement of a complementary view allows young people to pass through critical developmental stages without losing interest in their faith.²³

Both science and CS teachers stated in their interviews that at times students refer to the science–faith relationship or ask questions of this nature. Teachers, educational programs, and school communities are influential factors in the lives of adolescent students.²⁴ The perceptions and attitudes of teachers are communicated both explicitly and implicitly to students and inevitably contribute to the formation of students' personal worldviews. It is imperative, therefore, that teachers are well-informed about theological, philosophical and historical aspects of the science–faith relationship and do not perpetuate common myths or a conflict view that creates cognitive dissonance in the minds of students.

Teachers' Responses

Complementary Model

The responses of the CS and science teachers to the online survey give an indication of the perceptions and attitudes towards the science–faith relationship that are currently being communicated to students in Lutheran secondary schools. The complementary view received more positive responses from both science and CS teachers than the conflict and independence views. Two-thirds of the science teachers' responses and more than 80 per cent of CS teachers' responses were in agreement with the complementary view statements.

²³ Helmut Reich, "Between Religion and Science: Complementarity in the Religious Thinking of Young People," *British Journal of Religious Education* 11, no. 2 (Spring 1989); Helmut Reich, "Beliefs of German and Swiss Children and Young People about Science and Religion," *British Journal of Religious Education* 13, no. 1 (Autumn 1990).

²⁴ For more information refer to: Stephan Ellenwood, "Revisiting Character Education: From McGuffey to Narratives," *The Journal of Education* 187, no. 3, <http://www.jstor.org/divinity.idm.oclc.org/stable/42744098> (accessed March 23, 2016); R. Miller and J. Pedro, "Creating Respectful Classroom Environments," *Early Childhood Education Journal* 33 (2006): 293–299; John Loeser, "Values, Character, and Moral Education," *Research Starters: Education (Online Edition)* (2015), under "Research Starters," EBSCOhost <https://divinity.idm.oclc.org/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=ers&AN=89164545&site=eds-live> (accessed March 23, 2016). For example, Ellenwood affirms that it is possible for the school program as a whole to increase students' responsibility for and respectfulness towards others.

Table 13. Science teachers and the complementary model

Rating	Strongly Agree	Agree	Disagree	Strongly Disagree	No. of Responses	Weighting
Statement 49	6	9	4	0	19	3.11
Statement 50	9	5	3	3	20	3.00
Statement 51	2	8	8	2	20	2.50
Statement 52	4	10	3	3	20	2.75
Total	21	32	18	8	79	Av. 2.84

Table 14. CS teachers and the complementary model

Rating	Strongly Agree	Agree	Disagree	Strongly Disagree	No. of Responses	Weighting
Statement 49	6	9	1	1	17	3.18
Statement 50	9	8	0	1	18	3.39
Statement 51	4	11	3	0	18	3.06
Statement 52	2	9	3	3	17	2.59
Total	21	37	7	5	70	Av. 3.06

Science teachers generally agreed that modern science and Christian theology can learn from and help each other (Statement 49) and that the natural sciences can add to our understanding of God through the study of God’s creation (Statement 50). However they were divided when presented with the idea that the Genesis creation accounts can be understood in a way that corresponds with modern scientific explanations (Statement 51). The vast majority of science teachers (92 per cent) who accepted three or more complementary model statements identified with a Christian denomination, and three quarters of them attended church.

A science teacher interviewee who advocated a complementary relationship between science and faith explained the approach taken to the teaching of the evolution of life and the Big Bang in one Lutheran secondary school. This teacher said, “We’ve had a few discussions within our faculty of how we’re going to do this and so it’s not a contentious issue, but it is something we’re addressing to make sure we’re consistent in how we deliver that information.” This teacher also said, “I think it’s important we keep that message consistent. And I think as a science faculty at least—I can’t talk on behalf of the Christian Studies teachers—but as a science faculty, as long as we are teaching it with the same attitude.” This teacher stated that the distinction between science and religion was explained to the students from the outset, and that the parameters for discussions about biological evolution were defined: “I am very clear in what the word evolution means and how we look at it versus how sometimes society can see the word evolution.” Following an explanation of the difference between biological evolution and what this teacher termed “biblical evolution” which referred to the beginning of the universe, this

teacher added that, "I try to make that very clear distinction, and I think that a lot of students have respected that 'cause I've never had any of them come to me and question things as a science teacher anyway." In answer to the question of whether religious questions arise during science lessons this teacher replied,

Not really. I think I'm a bit of a person where I try and prevent problems from happening. Sometimes you can see a problem happening before it. And I think by laying that groundwork and making it very clear that this is where we're going in this discussion - this is where a discussion can go. I do tell them you can come and talk to me about it if we would like to discuss this. I am more than happy to sit down and have that chat, but I think by making those - that distinction very early on, it makes it a lot easier for the students.

Conflict Model

Almost two-thirds of the science teachers' responses were in disagreement with the conflict view statements, whereas more than 80 per cent of the CS teachers' responses were in disagreement with them.

Table 15. Science teachers and the conflict model

	Strongly Agree	Agree	Disagree	Strongly Disagree	No. of Responses	Weighting
Statement 41	0	3	16	1	20	2.90
Statement 42	0	10	9	1	20	2.55
Statement 43	1	4	9	6	20	3.00
Statement 44	4	7	4	4	19	2.42
Total	5	24	38	12	79	Av. 2.72

Table 16. CS teachers and the conflict model

	Strongly Agree	Agree	Disagree	Strongly Disagree	No. of Responses	Weighting
Statement 41	0	3	11	4	18	3.06
Statement 42	0	3	8	7	18	3.22
Statement 43	2	0	13	3	18	2.94
Statement 44	3	2	8	5	18	2.83
Total	5	8	40	19	72	Av. 3.01

The response to the statement that either science or theology must change its claims when there is conflict between the two (Statement 41) was comparable between science and CS teachers. Disparity emerged with the proposal that science and religion inevitably find themselves in conflict with each other (Statement 42) as again 83 per cent of CS teachers disagreed with this statement in contrast to one half of the science teachers. Seventy-five per cent of science teachers disagreed with the

statement that learning about the theory of evolution could be harmful to a person's faith in God (Statement 43), though again not as resolutely as CS teachers (89 per cent). More than one half of the science teachers (58 per cent) agreed with the idea that if evolution is true then the Bible must be wrong about the origins of life (Statement 44). However, there were as many science teachers who strongly agreed with this statement as those who strongly disagreed. In contrast, 72 per cent of CS teachers disagreed with this statement.

A science teacher interviewee, who claimed that there was a creation-evolution issue at the Lutheran school where this teacher worked, asserted that creation and evolution were not "compatible for theological reasons as well as scientific" because "biblically what it says about the beginnings is different to science." Subsequently, to justify why creation and evolution are incompatible, this teacher listed parts of the Bible that should be interpreted literally, stating that "the nature and character of God would have to be opposed to evolution—survival of the fittest," and briefly explained a personal theological perspective. A literal reading of the creation accounts in the book of Genesis and reluctance to associate God with competitive processes and death in the natural world appear to form the foundation of this science teacher's perception of conflict between evolutionary science and the Christian faith.

Independence Model

The teachers were divided in their opinions of the independence view of the science–faith relationship. More than one half of the CS teachers' responses were in disagreement with the independence view statements, whereas more than one half of the science teachers' responses were in agreement with these statements. Sixty-five per cent of science teachers' responses were in disagreement with the statement that the church need not re-examine its own teachings as a result of new scientific discoveries or theories as these do not touch upon spiritual realities (Statement 45). Conversely 65 per cent of their responses were in agreement with the idea that scientific theories and methods should not be influenced by Christian teachings (Statement 46) and the statement that there is no need to adapt Christian beliefs to scientific theories (Statement 48). Seventy per cent of their responses were in agreement with the statement that there is no need to adapt scientific theories to Christian beliefs (Statement 47). Statements 45 and 48 were affirmed by 56 per cent of the CS teachers' responses. On the other hand, 53 per cent of the CS teachers' responses were in disagreement with Statement 47, and a larger proportion of responses, 78 per cent, were in disagreement with Statement 46.

Table 17. Science teachers and the independence model

	Strongly Agree	Agree	Disagree	Strongly Disagree	No. of Responses	Weighting
Statement 45	2	5	12	1	20	2.60
Statement 46	6	7	6	1	20	2.10
Statement 47	7	7	5	1	20	2.00
Statement 48	6	7	6	1	20	2.10
Total	21	26	29	4	80	Av. 2.20

Table 18. CS teachers and the independence model

	Strongly Agree	Agree	Disagree	Strongly Disagree	No. of Responses	Weighting
Statement 45	3	7	7	1	18	2.33
Statement 46	1	3	11	3	18	2.89
Statement 47	2	6	8	1	17	2.47
Statement 48	1	9	7	1	18	2.44
Total	7	25	33	6	71	Av. 2.53

The 13 science teachers who disagreed with the idea that the church need not re-examine its own teachings as a result of new scientific discoveries or theories as these do not touch upon spiritual realities generally perceived scientific theories as more certain or fixed, and church teachings as more accommodating or adaptable. This is reinforced by the finding that most science teachers agreed that scientific theories should not be influenced by or adapted to Christian teachings. Most science teachers also saw a need for Christian teachings to take into account information gained from the field of science. However, some science teachers seemed to distinguish Christian teachings from Christian beliefs as most agreed that Christian beliefs do not need to be adapted to scientific theories. The results for Statements 45 and 46 correlate with the findings that 55 per cent of science teachers believed science deals with facts only and 60 per cent of science teachers thought that religion deals with both faith and facts. The findings are also consistent with the science teachers' high regard for scientific knowledge and the prevalence of scientism in their thinking.

The CS teachers were divided in their opinions of Statements 45 and 48 which refer to the revision of church teachings in light of scientific theories. They were also divided with regard to adapting scientific theories to Christian beliefs. This corresponds to the mixed response CS teachers gave to the idea that science deals only with facts, their general disagreement with creationism, and their general agreement with the idea of correspondence between a scientific theory of origins and the biblical creation accounts.

While the majority of science teachers disagreed with the idea that the church need not re-examine its own teachings as a result of new scientific discoveries or theories as these do not touch upon spiritual realities, a small majority of CS teachers agreed with this statement. This tends to suggest that the 10 CS teachers who agreed with this statement perceived science to be less certain and fixed than most science teachers. It also indicates that at least these 10 CS teachers viewed Christian beliefs and teachings to be more constant and enduring than scientific theories.

Comparison of the Three Models

Agreement with three or more statements from one model was perceived to indicate acceptance of that particular model. The respondents did not necessarily agree with three statements from any or only one model. The respondents often agreed with statements from all three models.

The complementary model statements received more positive responses from both science and CS teachers than the other two models. Overall CS teachers agreed more often with the complementary model statements than with the independence and conflict model statements combined. CS teachers were more likely than science teachers to agree with the complementary model. Science teachers were twice as likely to agree with the conflict model as CS teachers. Science teachers were also more likely to accept the independence model than CS teachers.

Table 19. Acceptance of statements associated with the three models

	Conflict model statements %	Independence model statements %	Complementary model statements %
Science teachers	36.71	58.75	67.09
CS teachers	18.06	45.07	82.86
Totals	27.81	52.32	74.50

The table below sets out a comparison of the three models based on the responses given by science teachers who accepted three or more statements indicative of each particular model. The three models are compared in terms of the teachers' responses to the statements concerning scientism, creationism, myths of the science–faith relationship, attitudes towards science, and attitudes towards Christianity.

Table 20. Comparison of three models—science teachers' responses to other concepts

Model	Scientism %	Creationism %	Myths %	Attitudes towards science %	Attitudes towards Christianity %
Conflict	46.67	45.00	52.00	96	66.67
Independence	33.33	25.71	55.81	100	78.57
Complementary	20.51	30.77	38.10	98.46	91.26

Scientism

One third of the responses given by science teachers affirmed the scientism statements; three times more than those of the CS teachers. Sixty per cent of science teachers rejected the claim that science has proven that only the natural, material world is real, whereas almost 80 per cent of CS teachers rejected this claim. Sixty per cent of science teachers disagreed that science explains why everything exists, whereas almost ninety per cent of CS teachers' rejected this statement. The more extreme version of scientism that claims people only need science, and religion is no longer needed, was rejected unanimously by CS teachers, whereas eighty per cent of science teachers rejected this idea. The twenty per cent of science teachers

who held this view often agreed with common myths of the science–faith relationship and mainly supported the independence and conflict approaches. It is significant in terms of the mission of the church and the aims of Lutheran education in particular that forty per cent of the science teachers who participated in the survey could be categorised as proponents of the principles of scientism and twenty per cent of the science teachers believe that religion is no longer needed.

Table 21. Scientism and science teachers

	Strongly Agree	Agree	Disagree	Strongly Disagree	No. of Responses	Weighting
Statement 29	3	5	6	6	20	2.25
Statement 30	2	6	6	6	20	2.20
Statement 31	1	3	5	11	20	1.70
Total	6	14	17	23	60	Av. 2.05

Table 22. Scientism and CS teachers

	Strongly Agree	Agree	Disagree	Strongly Disagree	No. of Responses	Weighting
Statement 29	0	4	4	10	18	1.67
Statement 30	0	2	4	12	18	1.44
Statement 31	0	0	2	16	18	1.11
Total	0	6	10	38	54	Av. 1.41

Creationism

Almost three quarters of the science teachers' responses, in contrast to almost 60 per cent of CS teachers' responses, rejected principles associated with creationism. Twenty per cent of science teachers in comparison to 28 per cent of CS teachers could be described as proponents of creationism. Interestingly, proponents of creationism usually nominated the complementary approach as being closest to their personal viewpoint. Ninety per cent of science teachers and CS teachers disagreed with the idea that biological evolution is false because it is not described in the creation accounts in the Bible. Three quarters of science and CS teachers disagreed that the creation accounts in Genesis explain exactly *how* the world began. However, the opinions of science and CS teachers differed in response to two ideas. Sixty per cent of CS teachers agreed that an accurate scientific theory of origins will correspond to the creation accounts in the Bible, in contrast to 60 per cent of science teachers who disagreed with this statement. Almost three quarters of the CS teachers agreed with the idea of including creationism and Intelligent Design in the science curriculum alongside Big Bang cosmology and the theory of evolution, whereas 70 per cent of science teachers disagreed with this idea.

While many teachers who accept creationism regard this as a complementary approach to science and faith, creationism theories are not accepted by the scientific community and are not included in the Australian science curriculum. If creationism

is presented as the view Christians should have, then the impression students take away from the discussion is that one must choose between modern science and Christianity. Creationism could hinder students who might otherwise accept that science and Christian teachings can moderate and inform each other. Christian schools must consider the implications of presenting students with conflicting theories and explanations in terms of learning outcomes and attitudes towards Christianity and science.

Table 23. Creationism and science teachers

	Strongly Agree	Agree	Disagree	Strongly Disagree	No. of Responses	Weighting
Statement 37	0	2	6	12	20	3.50
Statement 38	3	2	7	7	19	2.95
Statement 39	2	4	8	6	20	2.90
Statement 40	2	6	6	6	20	2.80
Total	7	14	27	31	79	Av. 3.04

Table 24. Creationism and CS teachers

	Strongly Agree	Agree	Disagree	Strongly Disagree	No. of Responses	Weighting
Statement 37	2	0	10	6	18	3.11
Statement 38	2	2	10	4	18	2.89
Statement 39	3	10	4	1	18	2.17
Statement 40	2	9	6	1	18	2.33
Total	9	21	30	12	72	Av. 2.63

It is unlikely that teachers in Christian schools who reject Christian beliefs or who reject modern scientific theories that are included in the Australian science curriculum will convey consonance between scientific and theological concepts to students. When negative attitudes towards modern science or Christianity are transmitted, cognitive dissonance can occur in the minds of students, which has been shown in several studies to produce negative outcomes.²⁵ Researchers have found that young people often mention the conflict between science and religion as a factor in their loss of faith.²⁶ The conflict thesis, a viewpoint held by a minority of Christians, is often perceived by young people to be the view held by the Christian church as a whole and this perception has the potential to impact on their openness to hearing God's promises of love and hope for their lives.

²⁵ See footnotes 22 and 23.

²⁶ Mason, Singleton and Webber, *The Spirit of Generation Y*, 115.

Pedagogical Approaches

One CS teacher explained that educating students about the history of science and religion was effective in addressing the perception that creation and evolution conflict:

I think sometimes when you walk them through the history of religion and science ... I think when you start showing the bigger picture of science and religion they realise they actually work quite well together. So I think it's the perception of a problem that's not actually even there in the first place. I think that's where the tension comes from.

This CS teacher broadened the approach to the science–faith relationship to encompass the core mission and focus of the Christian church. In reference to a perceived science–faith issue this teacher made the following observation:

It's symptomatic of a larger issue. It's a symptom of the issue of how we communicate Christianity and how Christianity interacts with the culture around it. I think if we communicated a well thought out, contextually relevant Christianity that really focuses on what is God doing in the world, what is Jesus about, evolution is a secondary, minor question [in] that ... [it] is given too much importance because it's not handled well in light of the rest of our Christian understanding. So there is, but I think it's a symptom of something significantly bigger.

According to enrolment data many students in Lutheran schools do not identify themselves as Christians and it is likely that many have limited theological or biblical knowledge.²⁷ Rather than drawing student's questions and comments about science and faith into a narrow focus on the authority and interpretation of particular biblical passages, it is important to open up the discussion on science and faith to involve the continuing activity of the Creator in the world: the immanence of Jesus Christ who loves and serves his people. This serves three purposes:

- The learning experience is authentic to the principles and aims of Christian education.
- The discussion is relevant to the students' lives as highlighted by this teacher.
- A Christocentric approach undermines the conflict model which is supported by a bibliocentric view of Christianity.

As this CS teacher emphasised, it is important to keep the gospel message of Jesus Christ as the focus when discussing the relationship between God and creation with students and others in the Christian school community.

²⁷ Lutheran Education Australia, "Statistical Report for 2014," 3–4.

<http://www.lutheran.edu.au/publications-and-policies/publications-online/lea-statistical-reports/> (accessed March 24, 2016).

Lutheran Education Australia, *Senior Christian Studies within Australian Lutheran Secondary Schools: A Report on the Surveys of Principals, Heads of CS, CS Teachers, and Senior CS Students* (Adelaide: Lutheran Education Australia, 2015), 9, 27. This document is used with permission.

Recommendations

In view of the finding that almost one quarter of the 38 participating teachers accepted scientism, and exactly the same proportion accepted creationism, Christian schools could consider ways to assist and support students as they encounter vastly different viewpoints at school and construct their own understandings of the science–faith relationship. Accurate and broadly accepted knowledge of the history and philosophy of science would help to dispel common science–faith myths, clarify the scope of science, and explain the foundations of scientism. Likewise, historical information about the emergence and development of Young Earth Creationism would raise students' awareness that this viewpoint is not synonymous with Christianity or encouraged by mainstream Christian churches. Students need to understand that Christians have different viewpoints regarding the science–faith relationship and that a particular approach to science and faith is not mandated by mainstream churches. Students informed in such a way might then reflect on different viewpoints or models as they construct their own way of relating scientific knowledge to their personal beliefs.

The teachers' responses towards scientism, creationism and common science–faith myth statements confirm the need for Christian schools to provide opportunities for teachers to consider the science–faith relationship philosophically and theologically. It is evident from the research conducted in Lutheran secondary schools that many teachers require greater knowledge of the history, philosophy and scope of science, the principles of scientism, and the origins of common myths about science and its interaction with Christianity. In conjunction with knowledge of the history and philosophy of science, teachers also need to understand the scope, epistemic goals and foundational precepts of theology that contribute to the dynamic nature of the science–faith relationship. Examples of influential theological precepts include the two books metaphor; natural theology; doctrines concerning creation, the Trinity, and Christology; God's transcendence and immanence; interpretation of Scripture and religious traditions; and Christian tenets of faith, wisdom and truth. A broader general knowledge of science and faith helps teachers to understand the variety of worldviews present in the classroom and present a more comprehensive account of the science–faith relationship.

In order to reduce cognitive dissonance among students and staff it is important that Christian schools present an accurate, non-polemical and consistent explanation of the relationship between science and faith. Consistency across the science and CS faculties would require these teachers to share this objective, to be familiar with both the science and CS curricula, and to be aware of the learning and attitudinal outcomes associated with the three models of the science–faith relationship. Well-informed science and CS teachers can capitalise on opportunities that arise to highlight points where science and theology can assist each other to describe and explain aspects of reality. Future research could further investigate how staff and students relate their scientific knowledge to their personal religious beliefs and explore ways for schools to formulate and include in the Christian education program a unified explanation of reality that maintains the integrity of science and respects the truthfulness of Christianity.

Based on the findings of the research conducted in Lutheran secondary schools, increasing the awareness of the positive contributions of the Christian church in the

world would serve to improve attitudes towards Christianity. Attention could be drawn to Christian beliefs and values, how these beliefs are expressed in Christian worship, fellowship, and service, and how they are embedded in the law and governance of many countries. Examples could be given of the liberating and peace-making efforts of Christians and the Christian church in the world. The contributions of the Christian church towards the development of Western society and culture including the sciences, the arts, social services, law, advocacy, care, and refuge would help to dispel science–faith myths about the church. Future research could investigate the avenues and opportunities available to Christian schools to further educate non-Christian staff and students about Christianity.

Conclusion

Research conducted within Lutheran secondary schools found that the majority of students and teachers who participated in the study believed that it is possible to correlate modern scientific theories with Christian beliefs. The complementary model of the science–faith relationship was associated with the highest level of positivity towards Christianity. It was also associated with high levels of positivity towards science. This finding is encouraging in terms of the possibility of students choosing to study and work in the fields of science while still having positive attitudes towards Christianity or holding onto Christian beliefs.

It is of concern that a significant proportion of students believe that science and faith conflict. The finding that one fifth of the science teachers accepted the more extreme version of scientism that claims people only need science and that religion is no longer needed raises questions about staffing choices and the availability of science teachers who uphold the Christian beliefs and values foundational to Christian schools. This finding should motivate Christian schools to purposefully and actively promote the idea that studying science and following the Christian faith are not mutually exclusive. Science educators who reject the principles of scientism and atheism are invaluable to Christian schools.

Students need to be nurtured in their formative years with positive learning experiences that extend from a complementary approach to modern science and faith so that they might become the science teachers of the future. This is an area where Christian schools can make a great contribution. It is very important that Christian schools seek ways to broaden the knowledge of staff and students in their communities about the science–faith relationship so that both science and Christianity are respected and valued for the contributions each make to understanding the original and ongoing creation of the world, and the interrelationship between humankind, the world and the Creator.

Bibliography

- Astley, Jeff. "The Science and Religion Interface within Young People's Attitudes and Beliefs." In *Religion, Education and Adolescence: International Empirical Perspectives*, edited by Leslie J. Francis, Mandy Robbins, and Jeff Astley, 39–54. Cardiff, Wales: University of Wales Press, 2005.
- Astley, Jeff, and Leslie J. Francis. "Promoting Positive Attitudes towards Science and Religion among Sixth-form Pupils: Dealing with Scientism and Creationism." *British Journal of Religious Education*. Vol. 32, no. 3 (2010): 189–200.

- Barbour, Ian G. *Religion in an Age of Science*. London: SCM Press, 1990.
- . "Science and Religion, Models and Relations." In Vol. 2 of *Encyclopedia of Science and Religion*, edited by J. Wentzel Vrede van Huyssteen, 760–766. Farmington Hills, MI: GALE Cengage Learning, 2003.
- Clayton, Philip. *The Problem of God in Modern Thought*. Grand Rapids, MI: William B. Eerdmans Publishing Company, 2000.
- Cooling, Trevor. "Science and Religious Education — Conflict or Co-operation?" *British Journal of Religious Education* 13, no.1 (Autumn 1990): 35–42.
- Dawkins, Richard. *The God Delusion*. Boston: Houghton Mifflin, 2008.
- Edwards, Denis. *How God Acts: Creation, Redemption and Special Divine Action*. Hindmarsh, SA: ATF Press, 1989.
- . *Jesus and the Cosmos*. Homebush, NSW: St Paul Publications, 1991.
- Egan, Josephine and Leslie Francis. "Does Creationism Commend the Gospel? A Developmental Study among 11–17 Year Olds." *Religious Education* 87, no. 1 (Winter 1992): 19–27.
- Ellenwood, Stephan. "Revisiting Character Education: From McGuffey to Narratives." *The Journal of Education* 187, no. 3. <http://www.jstor.org/dividntiy.idm.oclc.org/stable/42744098> (accessed March 23, 2016).
- Francis, Leslie J., Harry M. Gibson, and Peter Fulljames. "Attitude towards Christianity, Creationism, Scientism and Interest in Science among 11–15 Year Olds." *British Journal of Religious Education* 13, no. 1 (September 1990): 4–17.
- Gould, Stephen Jay. *Rocks of Ages: Science and Religion in the Fullness of Life*. New York: The Ballantine Publishing Group, 1999.
- Ham, Ken, Jonathan Sarfati, and Carl Wieland. *The Updated and Expanded Answers Book: The 20 Most-asked Questions about Creation, Evolution, and the Book of Genesis Answered!* Edited by Don Batten, Brisbane: Triune Press. 1999.
- Hitchens, Christopher. *god is not Great: How Religion Poisons Everything*. New York, NY: Twelve, Hachette Book Group, 2007.
- Kekes, John. *The Nature of Philosophy*. London: Basil Blackwell, 1980.
- Loeser, John. "Values, Character, and Moral Education." *Research Starters: Education (Online Edition)* (2015). *Research Starters*, EBSCOhost <https://divinity.idm.oclc.org/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=ers&AN=89164545&site=eds-live> (accessed March 23, 2016).
- Longest, Kyle C. and Christian Smith. "Conflicting or Compatible: Beliefs about Religion and Science among Emerging Adults in the United States." *Sociological Forum* 26, no. 4 (December 2011): 846–869.
- Lutheran Education Australia. *Diverse Views on Science and Faith within Lutheran School Communities*. Adelaide: Lutheran Education Australia, 2016.

- . *Senior Christian Studies within Australian Lutheran Secondary Schools: A Report on the Surveys of Principals, Heads of CS, CS Teachers, and Senior CS Students*. Adelaide: Lutheran Education Australia, 2015.
- . "Statistical Report for 2014." <http://www.lutheran.edu.au/publications-and-policies/publications-online/lea-statistical-reports/> (accessed March 24, 2016).
- Mason, Michael, Andrew Singleton and Ruth Webber. *The Spirit of Generation Y: Young People's Spirituality in a Changing Australia*. Mulgrave, Victoria: John Garratt Publishing, 2007.
- McGrath, Alister E. *Science and Religion: A New Introduction*. 2nd ed. Chichester, West Sussex: Wiley-Blackwell, 2010.
- Miller, R. and J. Pedro. "Creating Respectful Classroom Environments." *Early Childhood Education Journal* 33 (2006): 293–299.
- National Academy of Sciences. *Science and Creationism: A View from the National Academy of Sciences*. 2nd ed. Washington DC: National Academy Press, 1999.
- Peters, Ted. "Science and Theology: Toward Consonance." In *Science and Theology: The New Consonance*, edited by Ted Peters, 11—39. Boulder, Colorado: Westview Press, 1998.
- Peters, Ted and Martinez Hewlett. *Evolution from Creation to New Creation: Conflict, Conversation, and Convergence*. Nashville, TN: Abingdon Press, 2003.
- Reich, Helmut. "Beliefs of German and Swiss Children and Young People about Science and Religion." *British Journal of Religious Education* 13, no. 1 (Autumn 1990): 65–73.
- . "Between Religion and Science: Complementarity in the Religious Thinking of Young People." *British Journal of Religious Education* 11, no. 2 (Spring 1989): 62–69.
- Stenmark, Mikael. "Scientism." In Vol. 2 of *Encyclopedia of Science and Religion*, edited by J. Wentzel Vrede van Huyssteen, 783–785. Farmington Hills, MI: GALE Cengage Learning, 2003.
- . *How to Relate Science and Religion: A Multidimensional Model*. Grand Rapids, MI: William B. Eerdmans, 2004.
- . "Ways of Relating Science and Religion." In *The Cambridge Companion to Science and Religion*, edited by Peter Harrison, 278–295. Cambridge: Cambridge University Press, 2010.
- Stewart, Robert B., ed. *The Future of Atheism: Alister McGrath and Daniel Dennett in Dialogue*. Minneapolis: Fortress, 2008.
- Worthing, Mark William. *God, Creation, and Contemporary Physics*. Minneapolis, MN: Augsburg Fortress, 1996.

Bensted, K., "The Science–Faith Relationship and Its Impact on Students in Australian Christian Secondary Schools

———. "Science and Theology: A Brief History." In *God and Science in Classroom and Pulpit*, by Graham Buxton, Chris Mulherin, and Mark Worthing, 86–99. Preston, VIC: Mosaic Press, 2012.