Science and Religion: Students' Views and Understanding on Evolutionary Concepts

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Abstract

This study was carried out to explore the connection between science and religion especially focused on students' views and understanding of evolutionary concepts of biology at the secondary level. To find out the students' views and understanding of evolutionary concepts in connection with science and religion, a mixed-method design was used consisting of 50 participants of five secondary schools in Kathmandu Metropolitan City. The random sampling method was used for student selection while purposive sampling was used for schools selection. A five-point Likert scale, concept understanding inventory, and interview guideline tools were developed. The tools were validated for the collection of data. Thus, the gathered data were analyzed through descriptive statistics and thematic explanation. From the analysis, it was found that religion and science are continued debatable subjects in philosophy and theology till now. It also provides a philosophical analysis of how they interrelate with each other. The majority understanding of students has been found to be in conflict, science supportive, religion supportive, coalition, contrast, and supplementary views between science and religion towards evolutionary biology. This study concludes that students have common sense, content, and nature of science, non-science, and dialect-based misleading as well as corrected understanding about evolutionary biology. Thus, the creationism

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concept of evolution should be included in the science curriculum to achieve a better understanding of the evolutionary concept.

Keywords: Science, religion, evolution, god creation, biological evolution, and theology

Introduction

The term "science" was used only in the nineteenth century. Before this, it was mentioned as natural and experimental philosophy (Radder, 2009). Similarly, the term "scientist" refers to experts of various natural philosophies (Ross, 1962). The philosophers of science have tried to start science from other knowledge dealings from a particular religion. As science philosophers, Popper and Popper (2019)) claimed that scientific hypotheses are based on falsifiable principles but religion is based on spirituality. Dominguez (2017) points out the difference between science and religion, although the meanings of both terms are historically interrelated with each other.

The word "religion" was occasionally used before the nineteenth century. According to Aquinas, the meaning of religion expected goodness and was left without "religious" systems outside of what he considered accepted belief (Jillions, 2017). The term "religion" obtained its significantly wider present meaning through the works of early anthropologists. Jong (2017) systematically used the term for religions across the world. The connection between science and religion has a long history. According to Smith (1998), the development of scientific beliefs can be seen back to the seventeenth century. Before then, Western knowledge was based on theological explanations of the world (Hanley, 2012).

Many students get confused with scientific and religious concepts. It leads to negative impacts on learning science at the secondary level (Yasri, 2014). He also argues that the impact of these perceptions in the form of a binary relationship between science and religion, either biological evolution or spiritual creation, either accept or reject evolution. The views of the relationship between science and religion validate the levels of acceptance of evolution, positions on the relationship between biological evolution and god creation. He points out that capable of simple unequal views of students tended to hold well-matched views of the relationship between science and religion. It also shows that those accepting evolutions be likely to rely on science or reject religion as a cognitive ability whereas, those not

accepting evolution tended to rely on religion or reject science. It proves that many students had developed their scientific difficulty and acceptance of evolution without changing their religious beliefs through changes in their understanding of the evidence for evolution and their understanding of the connection between science and religion. The study holding friendly relation on the relationship between biological evolution and god creation tended to hold a wide range of misconceptions about evolution and the nature of science. Therefore, teachers should be aware of the roles of scientific and religious viewpoints in learning evolution. Similarly, the variety of ways for linking them to positive thinking would enhance students' learning on evolution. Students observe science as based on fact and closed dialogue. But religion has more common schooling with inspiring challenges and the expression of their understanding (Hanley, 2012).

The students' beliefs on the connection between science and religion reveal the importance of teachers' personal religious opinions to their views and concerning issues for both science and religion. This authority leads teachers to hold a contradictory connection, hence the creation of a false variation between science and religion. Therefore, teachers' personal religious views notify their opinions about the nature of science and its purpose (Mansour, 2011). Similarly, Tylor was at the center of the anthropological investigation on religion and culture in the book of Primitive Culture in 1871, but today Tylor's place in the anthropological belief is hardly recognized (Jong, 2017).

Charles Darwin put forward the theory of evolution, but Alfred Russell Wallace was the first to suggest a mechanism for the theory of evolution. Early in the sixth century BC, the Greek philosopher Anaximander postulated that life had started from the sea and that humans had developed from fish (Zuiddam, 2018). Buffon accepted that there could be change within species over time, although his support of the immutability of species made it impossible to call him an evolutionist (Lennox, n.d.).

In the late 1700s, Erasmus suggested that all organic life has developed from a common ancestor, although this was based mainly on assumption (Alai et al., 2015)presently the most important Italian philosopher of science and one of the most influential in the world. Scholars from seven countries explore his contributions in areas ranging from philosophy of physics and general philosophy of science to bioethics, philosophy of mathematics and logic, epistemology of the social sciences and history of science, philosophy of language and artificial intelligence, education and anthropology, metaphysics

and philosophy of religion. Agazzi developed a complete and coherent philosophical system, anticipating some of the turns in the philosophy of science after the crisis of logical empiricism and exerting an equal influence on continental hermeneutic philosophy. His work is characterized by an original synthesis of contemporary analytic philosophy, phenomenology and classical philosophy, including the scholastic tradition and these threads are reflected in the different backgrounds of the contributors to this book. While upholding the epistemological value of science against scepticism and relativism, Agazzi eschews scientism by stressing the equal importance of non-scientific forms of thought, such as metaphysics and religion. While defending the freedom of research as a cognitive enterprise, he argues that as a human and social practice it must nonetheless respect ethical constraints. (Alai et al., 2015) This time observations of nature had begun to cast indecision on the predominant theological belief that species were individually designed by God. A study of the fossil record had shown that it contained species that no longer existed, and theories were developed to explain this phenomenon. Similarly, Senju et al. (2010) demonstrated false belief understanding in young children through completely nonverbal measures. These studies have revealed that children younger than three years of age, who consistently fail the standard verbal false belief test, can anticipate others' actions based on their attributed false beliefs. The current study examined whether children with autism spectrum disorder (AS) believed in the immutability of species, maintaining that loss was remunerated for by repopulation, with more advanced species coming either from elsewhere or by acts of "special creation". Although these acts could be seen as being in harmony with simultaneous religious beliefs, there was a disinclination to accept that God would allow any of his creations to die out (Chan et al., 2019).

Another suggestion was transmutation, that remarkably Lamarck's theory of inheritance of acquired characteristics. He suggested that, far from being stable, species acquired beneficial adaptations during their lifetime and passed these on to their offspring. Species had an innate capability for self-improvement. For example, a giraffe that reached for leaves on tall trees would gradually stretch its neck and have offspring with longer necks (Southgate et al. 2007). Similarly, the disuse organs would cause the structure to contract and finally disappear (Angeles, 2019). These all indicate that the relationship between science and religion either conflict or collation contrasts views towards the evolutionary concepts.

Objectives of the Study

The following were the objectives of the study:

- To find out the views of students towards evolutionary biology in science, and

- To explore the students' understanding of evolutionary biology in the connection with science and religion

Materials and Methods

This study was based on a mixed-method design. It combines both qualitative and quantitative data as revealed by Creswell and Plano Clark (2011). Both random, as well as purposive sampling methods, were used for the sampling procedure. The random sampling method was used for student selection whereas purposive sampling was used for schools selection. Altogether 50 participants and five secondary schools in Kathmandu Metropolitan City were selected for the sample. A five-point Likert scale, concept understanding inventory as mentioned in the study of Yasri (2014), and interview guideline tools were made and validated for the collection of data. Thus, the gathered data were analyzed through descriptive statistics and thematic explanation. Qualitative data was acquired through interview protocols, questionnaires, and focus group discussions. The qualitative data was evaluated using the MAX QDA trial version while the quantitative data was analyzed using IBM SPSS – 21 version. Both data were interpreted by using descriptive statistics. The data were collected on February, 2020.

Views of Students towards Science and Religion

The views of students were based on Likert-type a five-point scale that was tabulated and interpreted through the descriptive pattern. Views of students were tabulated as follows.

Table 1: *Views of students conflict towards science and religion*

SN.	Views	SA	A	NS	D	SD
1	Some aspects of science seem conflicting to religion, but I don't understand it.	11 (22%)	26 (52%)	6 (12%)	4 (8%)	3 (6%)
2	Some aspects of science seem to conflict with religion. Which have their answers to the same question, in my opinion, science only provides the correct answers.	8 (16%)	28 (56%)	5 (10%)	4 (8%)	5 (10%)
3	Some aspects of science seem to conflict with religion. Which have their answers to the same question, in my opinion, religion only provides the correct answers.	11 (22%)	22 (44%)	8 (16%)	5 (10%)	4 (8%)

Where: *SA: Strongly agree, A: Agree, NS: Not sure, D: Disagree, SD: Strongly disagree*

Table 1 presents the views of students' conflict towards science and religion. The students' views that conflict between science and religion like SA, A, NS, D, and SD were 11 (22%), 26 (52%), 6 (12%), 4 (8%), and 3 (6%) respectively. It shows that the majority of the respondents 26 (52%) had seen that some aspects of science conflicting with religion as contradictory views of participants. The participants' views that independence between science and religion like SA, A, NS, D, and SD were 8 (16%), 28 (56%), 5 (10%), 4 (8%), and 5 (10%) respectively. It shows that majority of the responses 28 (56%) had seen that some aspects of science seem too independent with religion. Which have their answers to the same question, in my opinion, science only provides the correct answers, and science outplays religion as conflict views of participants. Similarly, the participants' views that independence between science and religion like SA, A, NS, D, and SD were 11 (22%), 22 (44%), 8 (16%), 5 (10%) and 4 (8%) respectively. It shows that the majority of the responses 22 (44%), had seen that some aspects of science seem to contradict with religion. Which have their answers to the same question, in my opinion, religion only provides the correct answers, and religion outplays science

as conflict views of participants. It was found that the majority of the students have religious supportive contradictory views towards the relationship between science and religion.

Table 2: *Views of students identical towards science and religions*

SN.	Views	SA	A	NS	D	SD
1	Science and religion do not contradict each other because they find answers to different questions in their way. Science explains the physical universe while religion addresses ethics, values, and behavior.	8 (16%)	24 (48%)	9 (18%)	6 (12%)	3 (6%)
2	Science and religion do not contradict each other because they construct knowledge in their way. Scientific knowledge is constructed through the interpretation of tests, while religious knowledge is constructed by interpreting religious texts.	7 (14%)	26 (52%)	8 (16%)	5 (10%)	4 (8%)

Where SA: *Strongly agree, A: Agree, NS: Not sure, D: Disagree, SD: Strongly disagree*

Table 2 presents the views of students identical towards science and religion do not contradict each other because they find answers to different questions in their ways. Science explains the physical universe while religion addresses ethics, values, and behaviors. Students' views that do not contradict science and religion like SA, A, NS, D, and SD were 8 (16%), 24 (48%), 9 (18%), 6 (12%), and 3 (6%) respectively. It shows that majority of the responses 24 (48%) had seen independent views of the relationship between science and religion. The participants' views that independence between science and religion like SA, A, NS, D, and SD were 7 (14%), 26 (52%), 8 (16%), 5 (10%), and 4 (8%) respectively. It shows that the majority of the respondents 26 (52%) had seen that science and religion do not contradict each other because they construct

knowledge in their ways. Scientific knowledge is constructed through the interpretation of tests, while religious knowledge is constructed by interpreting religious texts. It was found that students have identical views towards science and religion and no contradiction had seen in their views.

Table 3: *Views of students complementary towards science and religion*

SN.	Views	SA	A	NS	D	SD
1	It is possible to combine science and religion because they provide the same answer to the same question.	6 (12%)	30 (60%)	7 (14%)	5 (10%)	2 (4%)
2	Science and religion are complementary. Both are needed to understand all the useful aspects of life.	12 (24%)	23 (46%)	6 (12%)	6 (12%)	3 (6%)

Where SA: Strongly agree, A: Agree, NS: Not sure, D: Disagree, SD: Strongly disagree

Table 3 presents the views of students complementary towards science and religion. It is possible to combine science and religion because they provide the same answer to the same question. The students' views that combined science and religion like SA, A, NS, D, and SD were 6 (12%), 30 (60%), 7 (14%), 5 (10%), and 2 (4%) respectively. It shows that majority of the responses 30 (60%) had seen that combined views of the relationship between science and religion. The participants' views that complementary views between science and religion like SA, A, NS, D, and SD were 12 (24%), 23 (46%), 6 (12%), 6 (12%), and 3 (6%) respectively. It shows that the majority of the respondents 23 (46%) had seen that science and religion have complimentary views of each other because both are needed to understand all the useful aspects of life.

Table 4: *Views of students towards the modern theory of evolution*

SN.	Views	SA	A	NS	D	SD
1	The modern theory of evolution derived from diversity, heritage, and natural selection is the best scientific explanation of past and present biodiversity on the Earth.	9 (18%)	28 (56%)	4 (8%)	6 (12%)	3 (6%)

Where *SA: Strongly accept, AR: Agree with reservations, NS: Not sure, RSP: Reject some parts, SR: Strongly reject*

Table 4 presents the views of the students towards a modern theory of evolution. The students' views that the statement like, the modern theory of evolution derived from diversity, heritage, and natural selection is the best scientific explanation of past and present biodiversity on the Earth have SA, A, NS, D, and SD were 9 (18%), 28 (56%), 4 (8%), 6 (12%), and 3 (6%) respectively. The majority of respondents 28 (56%) had seen that agree with reservation views of the theory of organic evolution and biodiversity of the Earth as acceptance views of the participants. The findings like conflict, independence, dialogue, and integration views of students towards science and religion were consistent with the arguments of Marin & Lindeman (2021) in how do people perceive the relationship between science and religion and the roles of epistemic and ontological cognition study.

Student Understanding on Organic Evolution

The common sense understanding, content base understanding, an understanding based on the nature of science, and non-science-related understanding were presented in this heading.

Common Sense Understanding

The participants express that organic evolution is a biological difficulty that is the result of intelligent design, changes in individual organisms referred to as evolution, and creatures developing themselves to meet the needs of their surroundings. Similarly, biological difficulties are the consequences of evolutionary processes, evolution explains changes in populations of organisms, and evolutionary developments that happen

through natural selection are the understanding of participants about organic evolution as common sense. Among the first three understanding are misleading concepts and the second three concepts are the correct concept of participants' understanding about organic evolution in terms of common sense. These findings are understandings of students towards evolution are similar to the Yasri & Mancy (2014) in their study of understanding student approaches to learning evolution in the context of their perceptions of the relationship between science and religion.

Content-Based Understanding

Many participants pinpoint the content-based understanding as a misleading concept like, evolution explains the adaptation of organisms caused by ecological changes in which useful features of creatures are passed on, and evolution explains the origin of life, the first living things, or the origin of species from non-living particles. But some have the correct understanding of concepts of evolution. Evolution explains the straight progress of humans from monkeys. Biological evolution can be described as arising from variance generative rates among a population of creatures. Biological evolution is the clarification of the origin of species from previous species through natural selection, and biological evolution explains the origin of species from inherited species.

Understanding Based on the Nature of Science

Based on the nature of science some participants share misleading understanding like development does not qualify for testing in the laboratory, development lacks reliable support, development contradicts religious beliefs, evolutionary theories are based on inference, macroevolution cannot be observed in the laboratory, scientists arrangement the evolution, science declines religion, science is not changeable, science contains truth and certainty, and science is purposeful. But correct concept understandings are expressed by other participants like development is testable in the laboratory which supports the evidence of evolution, evolutionary theory does not weaken belief, evolutionary theories are based on research, evolutionary theories are developed from factual and historical facts, scientists fully accept evolution, science is limited to the natural world science seems to evolve, science is changeable, science is based on human effort. These students' understanding related to evolutionary biology was similar to the Smith (2010a) study of the current status of research in teaching and learning evolution with epistemological issues.

The Non-science-Related Understanding

The non-science-related concept like species existing today was created in six to twenty-four hour days or between 6000-10000 years is misleading understanding but correct understanding expressed by participants was species existing today have gradually evolved from their early forms over millions of years. Similarly, the dialect understanding where biological complications are the result of chance and randomness, evolution is a purposeless process, biological complexities are the results of natural assortment, and evolution is a vigorous process resulting in advantageous neutral or harmful characters. The result obtained from students' understanding of the evolution was also consistent with Smith's (2010b) study of the current status of research in teaching and learning evolution with pedagogical issues.

Implications on Science Learning

It has been established its usefulness for students learning evolutionary biology in science as the study conducted by Yasri, Arthur, Smith & Mancy (2013). It is well documented that many students extending from school to university levels in different backgrounds have to stumble upon complications in accepting the theory of evolution (Berkman et al., 2008, Francis and Greer, 2001, Martin Hansen, 2008, Taber et al., 2011, Yasri and Mancy, 2012). Schilders et al. (2009) argue that it is also difficult for biology teachers as they have to wisely consider students' variant ideas together with preparing how to teach evolution as an essential concept easy biological thinking. To arrange with this issue, they recommend that teachers should examine how students view the connection between evolution and religion. Although we have no opposition to this idea, we are surprised how this could be put into an exercise in real settings. In its place of having single discussions, biology teachers may wish to start dialogues about different views of the connection between science and religion. Certain ways in which this might be achieved are discussed in more detail.

Childs, Wiener, and Valle (2005) claim that many alternate concepts about evolution have their roots in non-standard ideas on the nature of science. We, therefore, claim that the finding of this study could be used to measure how students understand the nature of science. Biology teachers could generate deliberations with their students in terms of evolutionary biology and the nature of science by using it. Otherwise, teachers interested in using a more qualitative approach to get to know how their students

rationalize their acceptance or rejection of evolution could use it in classroom learning. This could be used as a model for formative valuation in which students are allowed to rapid their ideas freely from both scientific and religious viewpoints or any others so that the teachers would be able to improve their teaching methods to help improve students' achievement more successfully."

However, as argued in Yasri, Arthur, Smith, and Mancy (2013), it may be that it is the mediator to begin teaching on the suggestion between science and religion, only moving later to the connection between evolution and creation. It is hoped that this approach would allow students to become aware of reconciliatory positions before a clear discussion of the origins, as an already controversial topic.

Conclusion

The analysis of the study demonstrates that the secondary school students of Nepal's responses to evolution tends to be positive as many grasps suitable understandings of the relationship between science and religion. Students show the views like acceptance of evolution, and reconciliatory positions of the relationship between biological evolution and god creation in respect to the question of the origin of life. But some students may hold negative responses to the evolutionary concepts. This study provides some support to the idea that these learners can develop their scientific advantage and acceptance of evolution. The data show that this can occur without them having to change their religious beliefs through a better thought of the nature of science particularly the evidence for evolution, and a positive way of viewing the relationship between science and religion. We, therefore, agree with many science teachers that it is significant to focus on the teaching for students to appreciate what science is, how it works, and how it is dissimilar from non-science as well as similar to science but not exactly science.

It was concluded that the students have conflict, science supportive, religion supportive, coalition, contrast, and supplementary views between science and religion towards evolutionary concepts in science. The students have common sense on content, and nature of science, non-science, and dialect-based misleading as well as corrected understanding about evolutionary biology. Thus, the religious concept of evolution should be included in the science curriculum to achieve a better understanding of the evolutionary concept.

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