EasyChair Preprint

№ 10709

Integrating Science in Religious Education Using an Argument-Based Inquiry Approach to Generate Critical Discourses

Bilquis Hamid

August 15, 2023

Chapter # (assigned by editor, given in the file name)

TITLE
INTEGRATING SCIENCE IN RELIGIOUS EDUCATION USING AN ARGUMENT-BASED INQUIRY APPROACH TO GENERATE CRITICAL DISCOURSES

Author
Bilquis Hamid
Ismaili Muslims Charitable Trust, Uganda

ABSTRACT
Current secular and Religious Educational (RE) systems in Uganda are registering improvement, but not fast enough to meet the needs of its students. The traditional teacher-centered approach still prevails, where students depend on their teachers' instructions to perform any task and rarely think critically beyond the curriculum. However, research studies have proved that critical discources during classroom teaching, enable students to improve their critical thinking abilities and support their arguments with evidence. Extensive research results show improvement in students' critical thinking skills, when science subject teachers used the Argument Based Inquiry (ABI) approach in teaching. Relatively, less research is done in RE using science subject knowledge to prove religious claims through argumentation. In light of this, this small-scale study focused on developing students' critical thinking by integrating their scientific knowledge in RE by generating classroom discourses using the ABI approach. Students' responses (written and verbal) on religious claims are the source of data collected through transcribed audio recordings and students' and teachers' reflections. Data collected from six sessions were analysed using codification to document changes in students' critical thinking skills observed during their verbal and written contributions. The findings suggest that the ABI approach used during the study encouraged students to think beyond the RE curriculum, give extended responses, sustain group discussions for a longer time and improve skills to justify their claims using science subject knowledge. Although this is a small-scale study, it can inform the teaching-learning practices of RE teachers globally, particularly in the Ugandan context, who are interested in nurturing critical thinking skills among their students using argumentation. Affirming that argumentation is at the heart of classroom practice, this paper concludes with an insight that teachers need to develop their argumentation skills through ongoing professional development.

Keywords: Argument Based Iquiry approach, critical discourse, integration of Science in RE

1. INTRODUCTION

In most of the secular and Religious Education (RE) classrooms in Kampala Uganda, the traditional teacher-centred environment prevails. In such an environment students depend on their teachers' directions to perform assigned tasks. Hence, the teaching-learning processes tend to focus on knowledge transmission rather than knowledge

construction (Watkins, Carnell, Lodge, Wagner and Whalley, 2002). Students who acquire knowledge through memorisation are unable to think beyond the content taught. As critical thinkers, students are assumed to be able to challenge their own presumptions, their peers', their teachers', and justify their claims by giving reasons and providing evidences. Toulmin (1958) termed this process of engagement of students in justifying knowledge claims through reasons and evidences as argumentation. Research has been conducted across the curriculum to enhance students' critical thinking skills, and results have proven that the Argument-Based Inquiry (ABI) approach is one of the efficient strategies to make thinking visible (Braaten and Windschitl, 2011). However, in a RE classroom teachers face challenges to engage students in a critical discourse where they can provide evidence for a religious claims. Berkey (2003) acknowledges this issue in the RE and suggested that in addition to the religious knowledge in the religious curricula, subjects from modern sciences such as English, Math, and Science should also be included. Thus, it is essential for a RE teacher to relate religious information while cultivating scientific skills, which will enhance students' critical thinking and reasoning skills. Therefore, I adopted an argument-based inquiry approach in my RE teaching to enhance students' critical thinking while engaging them in critical discourses and justifying religious claims with their scientific knowledge.

The overarching aim of this study is to investigate whether the argument-based inquiry approach used by RE teachers during critical discourses allow students' critical thinking to develop. Additionally, the report would critically examine various theories discussing the integration of science in RE through the argument-based inquiry approach generating critical discussions. Further in the chapter, the study would focus on higher-level questions engaging students in the thinking and reflection process to produce critical responses (Seker and Komur, 2008). Finally, the chapter ends with a discussion of findings and recommendations for future research. Moreover, it will also provide input into my learning as a teacher-researcher from the study.

2. CONTEXT

The RE classes for the Shi'i Ismaili Muslim community in Kampala, Uganda, currently runs voluntarily where the RE teachers lack formal training, and there is still a need for skills development, especially in argumentation. The *Ta'lim* (Arabic for education) curriculum is the religious and cultural educational curriculum for the Shi'i Ismaili Muslim community developed by curriculum writers at the Institute of Ismaili Studies (IIS) for the implementation in pre-school, primary, and secondary levels of religious education for Ismaili students globally.

My class comprised twenty-five students, each sixteen years old (thirteen girls and twelve boys of mixed ability). The classes are held once a week in a STEP classroom equipped with all teaching resources. The length of each class was two hours. I taught the IIS secondary curriculum modules: *The Quran and its Interpretations, Faith, and Practice in Islamic Traditions, and Muslim Devotional and Ethical Literature.*

3. BACKGROUND

Various hands-on and minds-on activities motivate students towards the learning process, but to ensure they understand, teachers mostly concentrate on students' responses during discussions and debriefing sessions. Watkins et al., (2002) affirms the notion that engaging students in classroom activities is not enough; however, reflecting on these activities would serve the purpose of learning. Dewey (1938) further proposes the necessity of monitoring, reviewing and summarising the learnt skills for effective learning. According to my observations in the study, students reflect and processes the information received from different sourcesand construct the knowledge according to their understanding while learning in a social setting (Moon, 2008). Thus, intellectual engagement of students in knowledge construction is at the heart of the teaching-learning process, and is attributed to critical thinking. Brookfield (1993) believes that those students who are involved in an active thinking and reflecting process develop their critical thinking skills. Similarly, Brookfield (1993) and Fisher (2001) stress that critical thinking is a complicated but a fundamental thinking process, which allows the learners to think differently and challenge others' statements by providing evidences for their claims. I concur with the authors and have implemented an argument-based inquiry approach in my RE lesson activities to observe students' thinking patterns during discussions.

Due to disagreements regarding their conventional epistemological and ontological differences, religion and science are typically seen as being at odds with one another. However, Ian Barbour's taxonomy of the interplay between religion and science illustrates the connections between both fields (1991). Moreover, both subjects have a common objective to develop curiosity in students to think and use logical proofs to justify a claim. Kelly (2004) emphasizes that religious education should have an evolving pursuit, which has its applicability rooted in the changing times. Recent scientific advancements inspire our students to examine religious texts and support their claims using logic and scientific approaches. Hence, integrating scientific knowledge to prove religious claims would be a step towards eliminating the divide between the two subjects. Additionally, argument-based inquiry provides a systematic structure to observe the development of student's critical thinking and reasoning patterns.

4. DESIGN AND METHODS

This study has investigated the integration of science in RE using ABI approach during the teaching and learning process. This research study took its methodological framework as an action research approach, whereby I saw myself actively participating in the process and anticipating the change in my students'critical thinking (Robson, 2002). The purpose of action research is to bring change in real-life experiences based on a cyclical process of identifying a problem, planning a solution, acting out the method, and lastly reflecting on the outcomes (Denscombe, 2007; Hopkins, 2008; Watkins et al., 2002). Detailed lesson plans were designed and implemented with an ABI approach using Toulmin's (1958) framework of questions, claims, and evidence (refer to *Figure 1*) to observe how science integrated into RE.

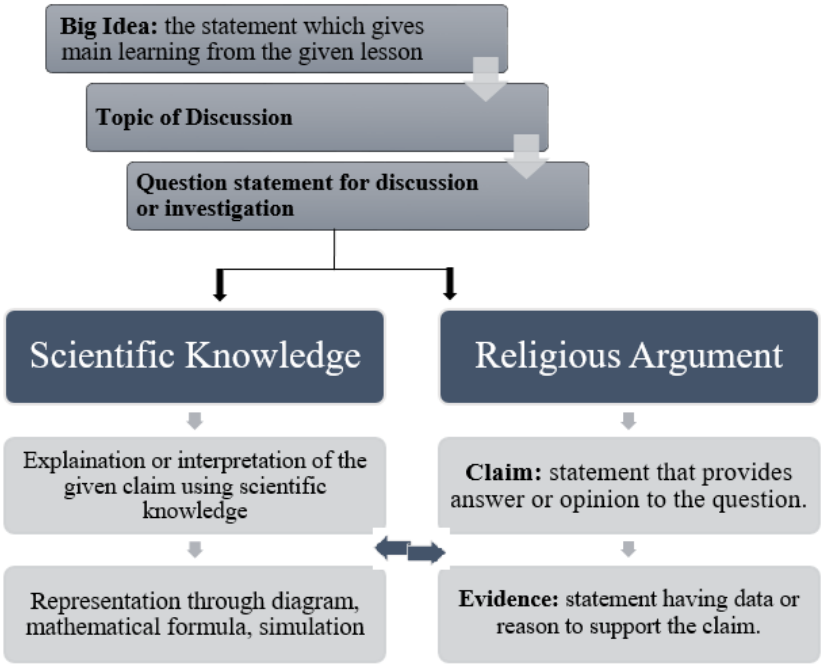

Figure 1.
[A framework for ABI approach in RE arguments using scientific knowledge.]

The ABI framework helped foster students' critical thinking skills. It allowed them to participate in discussions where they could question religious claims and support their opinions with evidence. Throughout the study, the ABI approach proved to be an effective process that enhance students' critical thinking. However, during the initial stages of the intervention, students find it challenging to ask questions about religious claims and provide evidence using scientific facts. Therefore, I had to develop questions on religious claims during the sessions to elicit critical responses from students. In addition, some misconceived notions of RE and science got highlighted while relating the religious concept with scientific knowledge. Hence, I had to explain those scientific and religious concepts again to clear any misconceptions, which was time-consuming. Therefore, I used to reflect on each lesson and planned activities according to the thinking level of my students and then executed the plan. Thus, my lesson plans were continuously in the process of change during the research study.

I strongly believe that this change was not an instant event; rather it was an ongoing process of human experiences in which results may develop over a period of time. Therefore, during the study I was continuously engaged in a reflective process, and improving my questioning techniques in order to nurture the critical thinking skills of my students (Brooker and Macpherson, 1999).

5. ANALYSIS AND DISCUSSION

Data analysis was an integral process throughout this research study. After each intervention the data collected through students' reflections and class observations were analysed and adjustments were made for the next lesson as a part of action research. The data collection methods involved ensured triangulation, as varieties of sources were used (Hopkins, 2008; Bell, 2005; Denscombe, 2007). However, to maintain the validity and reliability of the data, careful interpretation was needed for the results of this study,bearing in mind the complex context in which this study took place (Bell, 2005; Denscombe, 2007). The main aim of the study was to observe how ABI approach integrate science into RE and encourage learners to question religious claims, justify their claims through evidence. Additionally it also focused on students' critical thinking through their written responses given in their reflections.

A pre-coded analysis approach was used to analyse the data, because I was looking for argumentation such as questioning the religious claims and giving their judgements through evidence in my students' responses (Denscombe, 2007). To analyse students' responses in the classroom discussions and the written reflections, I looked for various elements of argumentation which I colour coded as in the example below. The elements I was looking for were: claims (yellow), logical reasoning (pink) and making judgements with evidence (green). Initial results showed that questioning religious claims was challenging for students, the discussions generated lasted for a short period, and only a few students participated. Additionally, they were unable to provide evidence for their judgments. For instance:

Religious Claim: Prophet Muhammad (PBUH) said,
"The Hour will not be established till the sun rises from the west".

ST1: The statement is wrong.
TR: What is the reason for your statement?
ST1: Because the sun always rises in the east.

Here the student only gave a claim and for justification gave another claim without the evidence. However, when I argued on the given religious claim with reason and evidence, it worked well and informed the outcomes of the study, for instance,

TR: The given religious claim cannot be wrong because, as Muslims, we believe that God is the ultimate truth and Prophet Muhammad (PBUH) is the final messenger of God and the messenger of God always speaks what God shares with him. As is stated in the Holy Quran:
"Nor does he speak out of [his own] desire; it is just a revelation that is revealed [to him]" (53:3-4)
ST2: It is actually the earth that moves round the sun which makes the day and night, sun never moves.

ST3: Whatever be the case the sun rises or the earth rotates, day starts from the eastern side of the earth.
ST2: Let me illustrate through diagram. (pause) {the student draws on the board and showed his thinking}
ST2: Here is the sun stationary, and this is the Earth, moving around the sun. One day it is the final hour or end of times, and the Earth will turn around and start moving in the opposite direction.
ST1: What are you saying? The Earth can't move in the opposite direction as it rotates on its axis, and it will always move from east to west. Therefore, the eastern side of the Earth will always face the sun first.
TR: What makes the Earth remain on its axis and move in its orbit?
ST4: the force of gravity.
ST4: It means because of the gravitational force, all the planets are moving in their orbit around the sun, and if we remove this gravitational force from the milky way, then all the planets will move in different directions. As we know, there is no force of gravity in the universe, and when space shuttles and astronauts reach the universe, they start moving freely. Hence, if there is no gravitational force in the milky way, then the Earth will move freely without the attraction, and that will cause it to move from west to east.

It is evident from the aforementioned discourse that when students are not pressured to provide right answer, it helps them to develop their thinking and content knowledge (Brown, 1994). Thought provoking questions such as, “What makes the Earth remain on its axis and move in its orbit?, initiated the argumentation process in ST4 as she started analysing the claim more deeply and presented a different perspective. Hence, ABI approach in teaching and learning process acted as scaffolding in students’construction and co- construction of knowledge.

During this study I observed that less number of students demonstrated their argumentation and critical thinking skills. Firstly, religious claims are beyond students' imagination and thinking capability. Secondly, students are not well versed in RE and science subject knowledge, and they find the topics discussed in the curriculum challenging to justify their claims with logical reasoning. Therefore, teachers need to simplify and modify their complex religious and scientific claims by rephrasing them according to students' cognitive level such that they easily understand them and respond.

6. FUTURE RESEARCH AND CONCLUSION

The results of this study have important implications for educational practice. The findings suggest that the ABI approach used in teaching and learning develops students' argumentation skills. Therefore, teachers need training to understand the effectiveness of the ABI approach. Hence, a future research study could explore the impact of trained teacher-generated critical discourses in classroom practice to

develop students' argumentation skills. The small-scale study in the Kampala STEP class focused on whether the ABI approach used during classroom discussion enhances students' argumentation and critical thinking skills. Therefore, a series of religious claims were designed and posed during discussion sessions and later reflected on their impact on students' thinking skills. However, some religious claims were challenging for students to argue, and teachers' argumentation scaffolded students' construction of knowledge (Vygotsky, 1978). Near the end of my six-week intervention, I observed that my students sustained group discussions for a longer time when I posed religious claims. They also demonstrated improved skills to justify their views with evidence and engaged in critical discussions.

REFERENCES

Basel N. Harms U. Prechtl H. Weiss T. & Rothgangel M. (2014). Students arguments on the science and religion issue: the example of evolutionary theory and genesis. Journal of Biological Education V48 N4 (2014 10 02): 179-187. https://doi.org/10.1080/00219266.2013.849286

Barbour I. G. (1991). Religion in an age of science ([3rd print.]). Harper.

Berkey, J. (2003) The Formation of Islam: Religion and Society in the Near East, 600 -1800, Cambridge: Cambridge University Press.

Bell, J. (2005). Doing Your Research Project: A Guide for first – time Researchers in Education, Health, and Social Sciences. United Kingdom: Open University Press.

Braaten, M., & Windschitl, M. (2011). Working toward a stronger conceptualisation of scientific explanation for science education. Science Education, 95, 639-669.

Brooker, R. & MacPherson, I. (1999). "Communicating the Processes and Outcomes of Practitioner Research: an opportunity for Self-Indulgence or A Serious Professional Responsibility?", Educational Action Research 7(2), 207-220

Brookfield, D. S.(1993). Developing Critical Thinkers: Challenging Adults to Explore Alternative Ways of Thinking and Acting. United Kingdom: Open University Press.

Brown, H. D. (1994). Teaching by principles: An interactive approach to language pedagogy. Englewood Cliffs, N.J: Prentice Hall Regents.

Denscombe, M. (2007). The Good Research Guide for small-scale social research Projects. Maidenhead: Open University Press

Dewey, J. (1938). Experience and Education. New York: The Macmillan Company.

Fisher, A. (2001). Critical thinking: An introduction. Cambridge, U.K: Cambridge University Press.

Hopkins, D. (2008). A Teacher's Guide for Classroom Research. England: Open University Press.

Kelly, A.V.(2004). The Curriculum: Theory and Practice, London: sage (Chapter 2)

Moon, J. (2008) Critical Thinking: An Exploration of Theory and Practice. London and new York: Taylor & Francis Group.

Robson, C. (2002) Real World Research. 2nd ed. Oxford: Blackwell Publishing.

Şeker, H. & Kömür, S. (2008). The relationship between critical thinking skills and in- class questioning behaviours of English language teaching students. European Journal of Teacher Education, 31(4), 389-402. doi:10.1080/02619760802420784

Toulmin, S. (1958). *The uses of Arguments.* Cambridge University Press.

Vygotsky, L. S. (1978) Mind in Society: The Development of Higher Psychological Processes (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.), Cambridge, MA: Harvard University Press.

Watkins, C. et al. (2002). Effective Learning. NSIN Research Matters17. (Summer). London: Institute of Education.

ACKNOWLEDGEMENTS

First, I will give praise, honour, and glory to God for enabling me to complete this journey.

The two years of my life in London have been powerful learning experiences and personal growth. I will always be grateful to those who encouraged, inspired, and supported me.

I am very grateful to the faculty members at the Institute of Ismaili Studies (IIS) and the Institute of Education (IOE) at the University of London for offering me the opportunity to be a part of this tremendous Secondary Teacher Education Programme (STEP) journey.

I thank my advisor Dr. Karen Turner, who modeled scholarly leadership, supplied thoughtful and immediate feedback, and inspired me to reach higher levels.

AUTHOR(S) INFORMATION

Full name: Bilquis Hamid
Institutional affiliation: The Ismaili Muslims Charitable Trust, Uganda
Institutional address: 9/11 martin Road, Namirembe road, Kampala-Uganda, Post Box No.10658.
Biographical sketch: Bilquis is a STEP teacher currently serving the ITREB, for Uganda. She has served ITREB, Pakistan as a STEP teacher for ten years. Her professional career started in 2002 with Aga Khan Education Service, Pakistan as a Math teacher. She has also worked as a Weekend visiting faculty at Hamdard University Karachi (HUK).

She received her degrees: MA and MTeach, from IOE & IIS London in 2011. Additionally, she is a Gold medalist in the M. Ed program in 2008, from HUK. In a volunteer capacity, she has served as a Career Advisor in 2013, as a PGPP professional of the ASST team IIS London in 2020, and as a workshop lead in Camp CONNECT in 2020. As a content Master trainer of Rays of Light, Pakistan, she trained Points of Light, Tour Guides in Kenya and Pakistan in 2018.

She has also worked as a consultant at Premier DLC and designed curriculum modules for TOT, and conducted training sessions for teachers at Sindh Education Foundation, Pakistan, funded by USAID (NGO).