Chapter #25

INTEGRATING SCIENCE IN RELIGIOUS EDUCATION USING AN ARGUMENT-BASED INQUIRY APPROACH IN KAMPALA ISMAILI SECONDARY CLASSROOM

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ABSTRACT
Current secular and Religious Educational (RE) systems in Uganda are registering improvement, but not fast enough to meet the needs of its students. Most secular and religious classrooms still follow a teacher-centred approach where students depend on their teachers' instructions to perform any task and rarely think critically beyond the curriculum. Extensive research indicates that students' critical thinking skills improve when science teachers use an Argument-Based Inquiry (ABI) approach. Relatively, less research is done in RE using science subject knowledge to prove religious claims through argumentation. Thus, this small-scale study aimed to enhance critical thinking in students by integrating science into religious education through discourses using the ABI approach. Data collection methods included students' written and verbal responses to religious claims and reflections from students and teachers. Data collected from sixteen sessions were analysed using codification. The findings suggest that the ABI approach facilitated critical thinking, extended discussions, and improved justification of scientific claims beyond the RE curriculum. This small study can inform global RE teaching practices to develop critical thinking skills in students using argumentation. Affirming that argumentation is at the heart of classroom practice, this paper concludes that teachers need to develop their argumentation skills through ongoing professional development.

Keywords: argument-based inquiry approach, critical discourse, integration of science in religious education.

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, & Whalley, 2002). As a result, 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 peers', their teachers' along with their own presumptions, 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 & Windschitl, 2011). However, in a RE classroom, teachers face challenges in engaging students in a critical discourse where they can provide evidence for a religious claim. Berkey (2003) acknowledges this issue in the RE and suggested that subjects from modern sciences such as English, Math, and Science should also be included in the religious curricula. Meanwhile Reiss (2013) argues that in

addition to the inclusive RE curriculum, the pedagogical approach should enable students to understand religious claims using scientific truths, and to be tolerant of how people of other faiths have understood the world. Thus, it is essential for RE teachers to relate religious information with that of science, during the religious formation of their students, while cultivating students' critical thinking and reasoning skills. Therefore, I adopted an argument-based inquiry approach in my RE sessions to enhance students' critical thinking while engaging them in critical discourses and to help them understand religious claims with authentic scientific knowledge.

The overarching aim of this study is to investigate whether the argument-based inquiry approach used by RE teacher during critical discourses allow students' critical thinking to develop. Additionally, the report would critically examine Barbour theory of integrating science (1991) in RE and observe whether critical discussions are generated through the argument-based inquiry approach. Furthermore, the chapter would focus on higher-level questions engaging students in the thinking and reflection process to produce critical responses (Şeker & Kömür, 2008). Finally, the chapter ends with a discussion of findings and recommendations for future research, while providing 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. Recent developments in the secondary *Ta'lim* curriculum deal with challenging subjects like religion and integrates it with secular scientific concepts so that students can make meaning of their learning.

My class comprised twenty-five 16-year-old students (thirteen girls and twelve boys of mixed ability). The classes were held once a week in a STEP classroom equipped with all teaching resources. The length of each class was two hours, and these classes lasted for six months. 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 process the information received from different sources and 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 evidence for their claims. I concur with the authors and have implemented an argument-based inquiry approach in my RE session activities to observe students' thinking patterns while presenting scientific arguments to approve or disapprove religious claims.

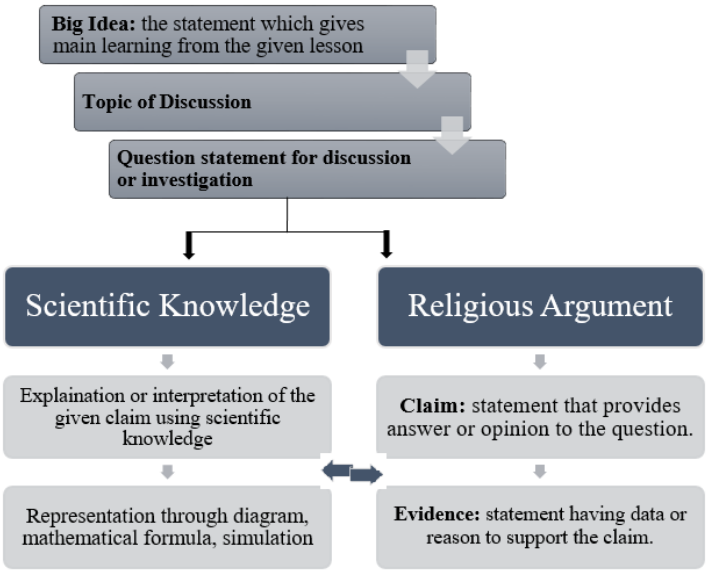
Due to disagreements regarding their conventional epistemological and ontological differences, religion and science are typically seen as being at odds with one another.

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. For instance, scientific advancements in Artificial Intelligence 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. And argument-based inquiry would provide a systematic structure to observe the development of students' critical thinking and reasoning patterns. However, all scientific claims cannot be relatable to religious claims, which is the limitation of the study.

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 action research approach as the methodological framework, 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 enhanced students' critical thinking. However, during the initial stages of the intervention, students found it challenging to ask questions about religious claims and provide evidence using scientific facts. For instance, when I asked questions related to natural phenomena, most of the students provided scientific justification for the question; however, they found it challenging to prove that necessity through a religious claim. Therefore, I had to develop more questions on religious claims during the planning and implementation 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 that are elaborated in the analysis and discussion. Hence, I had to explain those scientific and religious concepts again to clear any misconceptions, which was time-consuming. Therefore, I reflected on each lesson and planned activities according to the thinking level of my students and then executed the lesson plan. Thus, my lesson plans were continuously in the process of change during the research study.

This change was not an instantaneous event rather it was an ongoing process of human experiences in which results developed 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 & 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 integrates science into RE and encourages learners to question religious claims, and justify their claims through evidence. Additionally, it also focused on students' critical thinking through their verbal discussions and written responses given in their reflections.

A pre-coded (**Bold**, Underline, *Italic*) analysis approach was used to analyze 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 analyze students' responses in the classroom discussions and the written reflections, I looked for various elements of argumentation which I coded as in the example below. The elements I was looking for were: claims (**Bold**), logical reasoning (underlined) and making judgements with evidence (*Italic*). Initial results showed that questioning religious claims was challenging for students, the discussions generated lasted for a brief period, and only a few students participated. Additionally, they were unable to provide evidence for their judgments. Transcription conventions include ST referring to student and TR referring to teacher researcher.

For instance:

Religious Claim: Prophet Muhammad (Peace Be Upon Him) 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.**

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]" (Sura 53: verse 3-4)

(Pause)

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}

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.*
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.

The student 1 only gave a claim initially and provided another claim without the evidence for justification. However, when I modeled the process of question-claim-evidence, on the given religious claim with reason and evidence, it enabled students to rethink on their statements and justify their position, and informed the outcomes of the study.

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. Students were making meaning of the religious claims, using their scientific knowledge, questioning their beliefs, and justifying their assumptions. Hence, ABI approach in teaching and learning process acted as scaffolding in students' construction and co-construction of knowledge.

Near the end of the my six-months intervention, I observed that my students sustained group discussions for a longer time when posed religious claims. They also demonstrated improved skills to justify their views with evidence and engaged in critical discussions. The implementation of the ABI approach in my classroom teaching also helped me as a teacher researcher to identify some religious and scientific misconceptions in students' understanding. For instance, during discussions student immediately claimed the religious claim was wrong, due to his lack of religious knowledge, where I intervened to clarify the misconception and presented my claims with evidence from scripture. Secondly, when I observed that the scientific information was misconceived, I asked another question to let students think further. 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 small-scale study in the Kampala STEP RE classroom focused on whether the ABI approach used during classroom discussion enhances students' argumentation and critical thinking skills. Initially, the argumentative claims posed during sessions were challenging for students to argue. However, the teachers' intervention proved to be scaffolding students' construction of knowledge (Vygotsky, 1978). 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.

Additionally, the ABI approach helped students to think beyond the curriculum and make informed decisions.

The findings of this study revealed some misconceptions related to religious and scientific information during the interventions. Therefore, teachers should be well-informed about religious and scientific knowledge to facilitate students learning. Hence, professional teacher training is required for teachers to understand the underpinning concepts of science and religious education. Additionally, teachers need ongoing professional development in designing argument questions and understanding 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.

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