



Cross-curriculum Teaching and Learning in the Secondary School: Geography, History, Religious Education and Mathematics in Kenya's Competency Based Curriculum

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Abstract

Inadequate learners' engagement in Geography, History, Religious Education, and Mathematics (GHREM) can lead to a lack of knowledge and appreciation for the importance of these learning areas in various careers. This has the potential to have far-reaching implications for a country's need for well-educated graduates in Geography, History, Religious Education, and Mathematics to ensure socioeconomic, cultural, and political development. The implication is that there will be a lack of personnel to take up a career in these learning areas in the future. This study looked into the importance of GHREM in the National Curriculum as well as their relationship. The study relied on library research and a qualitative research design to examine published articles related to the research objectives from 1945 to 2023. From the over 100 articles accessed, this investigation purposefully sampled 25 published articles. Content analysis was used to validate the articles. Data was collected through documentation and analyzed through content analysis. The analysis of 25 related articles revealed that the GHREM learning areas are interconnected and interdependent. Geography teaches learners about their surroundings and helps them understand them. History helps learners understand the evolution of various human endeavors. Religious education

helps learners understand various religions and their practices while also promoting tolerance and respect for diversity, as well as ethical and moral behavior. Mathematics introduces learners to concepts such as numbers, algebra, geometry, and statistics, while also encouraging abstract thinking and problem-solving abilities. These learning areas are related because they are all required for learners to understand and interpret their surroundings, as well as to succeed in a variety of careers. Overall, each learning area helps to develop a well-rounded education that prepares learners for careers and beyond. According to the study's findings, these learning areas should be integrated across the curriculum.

Keywords: Geography, History, Religious Education, Mathematics, CBC, GHREM Education

Introduction

The twenty-first century is both exciting and challenging for learners. To succeed, young people must be capable of problem-solving, collaboration, and inquiring. Given that this country is embracing competency-based learning to help learners maximize their education and prepare them for success in schools, colleges, careers, and life. Competency-Based Learning (CBL), according to Teach Thought Staff (2023), is an educational approach that emphasizes the learners' demonstration of desired learning outcomes as central to the learning process. It is primarily concerned with a student's progression through the curriculum at their own pace, ability, interest, and needs. As competencies are demonstrated, learners progress. CBL and mastery-based learning are similar, with the main difference being that competency-based learning frequently focuses on observable skills or 'competencies,' whereas mastery learning is academic and focuses on concepts and skills. CBL is also defined by the Great Schools Partnership (2014) as an instructional, assessment, grading, and academic reporting system that relies on learners demonstrating that they have learned the knowledge and skills that they are expected to learn as they progress through their education. In public schools, competency-based systems use state learning standards to establish academic expectations and define "competency" or "proficiency" in a specific course, subject area, or grade level (although other sets of standards may also be used, including standards developed by districts and schools or by subject-area organizations. The overarching goal of competency-based learning is for learners to acquire the knowledge and skills required for success in school, higher education, careers, and adulthood. If a learner does not meet the expected learning standards, he or she will typically receive additional instruction, practice time, and academic support to assist them in achieving competency or meeting the expected standards. In summary, CBL is an outcome-based approach to education that ensures learner proficiency in learning through the demonstration of the knowledge, skills, values, and attitudes required for dealing with real-life situations at the age and grade-appropriate level.

The Apollo School, according to Shawn (2019), is a pioneer in the field of competency-based learning and assessment. Central York High School, a regular Pennsylvania public school, houses this voluntary program for learners in grades 11 and 12. For a semester, learners attend four-hour blocks of classes. These classes, which combine English, social studies, and art, are co-taught by three teachers, one from each learning area. At the Apollo School, learners design their schedule, which includes independent and group work, one-on-one appointments with teachers, and optional mini-lessons. The remainder of their day is spent on a traditional school schedule. To complete their

programs, learners at the Apollo School are responsible for designing and completing four major projects, each of which is connected to a common theme and aligned to standards in all three learning areas. Learners meet with teachers to discuss critical thinking skills such as reasoning, perspective, context, synthesis, communication, and time management, as well as how their projects meet the required standards; Apollo's results were positive. Other countries, including Kenya, were influenced to switch from the old curriculum (8-4-4) to the new Competency-Based Curriculum (CBC). According to the Kenya Institute of Curriculum Development ((KICD), 2013), a curriculum change was necessitated by a need assessment of the curriculum concerning the nation's aspirations. Also, recommendations made by previous education commissions since 1964 have never been fully implemented, leaving gaps in educational offerings. The main difference in Kenya is that the 8-4-4 (old curriculum) focuses on mastery of content, which encourages rote learning, whereas the CBC (new curriculum) focuses on learners' performance of observable skills and competencies. In response to rising youth challenges such as unemployment in the country, the new competency-based curriculum is intended to better prepare Kenya's youth to thrive in a changing world.

Kenya began implementing the new Competency Based Curriculum (CBC) in 2017, with learners attending secondary school for six years rather than four. At senior high school, there are three pathways. They are learning areas in the Arts and Sports, Social Sciences and Science, as well as Technology, Engineering, and Mathematics (STEM). Because social science pathway learning areas provide the human element in the curriculum, this investigation focused on them. These learning areas shed light on the variety of human behavior. As a result, they are crucial to everyone's education. At the Senior Secondary School (SSS) level, the social science pathway learning areas include history and citizenship, geography, Christian religious education, Islamic religious education, Hindu religious education, business studies, and mathematics. Students must select a minimum of three (3) and a maximum of five (5) of these subjects, according to the new Kenyan Competency Based Curriculum (2023) for secondary education. Because of time and space constraints, this study focused on Geography, History, Religious Education, and Mathematics (GHREM) by examining the meaning and importance of each subject, as well as the relationship.

According to Richard et al. (2012), geography is a multidisciplinary subject with numerous connections to other fields such as the sciences. According to Holt (2009), geography is divided into several branches, including the plant societies that form forests and grasslands are the focus of vegetation geography. Political geography is concerned with how government forms and power relations differ from one country to the next. Economic geography is concerned with the mapping and changes in the localization of economic activities. Social geography is concerned with different social groups living in segregated or mixed neighborhoods.

History is the study of past human interactions with their physical, social, economic, and political environments, with a focus on where we came from, where we are, and what we aspire to be as humans. Houghton (2002) defines religion as "belief and obedience to a supernatural power with control over human destiny." Tuan (1976) observes that "a religious person seeks coherence and meaning in his world." The religious impulse is to make connections. As a result, by nature, all humans are religious. Many of the world's major religions are inextricably linked to particular

racial groups, cultures, political systems, and lifestyles, making it difficult to imagine one without the other. Thailand or India, for example, would be difficult to imagine without Buddhism or Hinduism. Christianity has become inextricably linked with the way of life of Western culture.” Religion, in essence, is so deeply embedded in the matrices of many societies that its boundaries are permeable and its effects pervasive. As a result, we define religion as a collection of organized beliefs, practices, and systems, the majority of which are associated with the belief and worship of a controlling force, such as a personal god or another supernatural being.

Mathematics, as defined by Zutaah, Miheso, and Ondigi (2022), is the study of quantity, space, change, and structure. Patterns are used in mathematics to form new hypotheses and resolve doubts about mathematical proofs. GHREM Education is concerned with the study of Geography, History, Religion Education, and Mathematics in this study.

Statement of the Problem

GHREM education lays the groundwork for learners to learn other subjects. It enables them to function effectively in society. GHREM education adds a human dimension to the curriculum. Inadequate GHREM education results in only partial development of spatial awareness. As a result, learners will be unable to classify and make sense of the physical objects in their surroundings. Geography, history, religious education, and mathematics are now optional subjects for senior secondary school students in Kenya’s CBC curriculum. As a result, the vast majority of learners will be unable to study these subjects. The implication is that we will most likely not have many teachers to teach these learning areas in the future, and other professionals developed from these subjects. Geography, history, Religious education, and mathematics are core subjects in early childhood and middle school education, but not in senior high school. The importance of geography, history, religious education, and mathematics in the National Curriculum was investigated in this study. This study also looked into the relationship between these subjects.

The following specific objectives guided this study: to investigate the importance of geography, history, religious education, and mathematics in the Kenya National Curriculum; and to establish the relationship between geography, history, religious education, and mathematics. The following research questions were raised as a result of these objectives: What is the importance of geography, history, religious education, and mathematics in the Kenya National Curriculum? and how do geography, history, religious education, and mathematics relate? The literature related to the importance of GHREM in the National Curriculum was discussed as follows:

Importance of Geography, Religious Education, and Mathematics.

Geography is a very broad subject. As a result, many people regard the various definitions of geography proposed over the years as inadequate. To address this, (Murphy, 2014; Robinson, 1976; Pattison, 1964) proposed the “Four Traditions of Geography” concept in 1964. These traditions are (1) the spatial or locational tradition, (2) the man-land or human-environment interaction tradition, (3) the area studies or regional tradition, and (4) the earth science tradition. These are broad sets of geography philosophies intertwined within the discipline. Geographers organize the major sets of thoughts and philosophies within the discipline in a variety of ways. According to

Wikipedia, the free encyclopedia (2023), geography is the systematic study of the Earth's features and the phenomena that occur on it. To be considered geographical, something must have some sort of spatial component that can be plotted on a map, such as coordinates, place names, or addresses. As a result, geography has become associated with cartography and place names.

The importance of geography stems from more than just understanding the physical properties of the world, it also stems from the way it connects people to their surroundings. Understanding this interconnectedness makes geography an important part of education, of our understanding of the world around us, and human history. Kerski (2011), Esri's education manager and 2011 president of the National Council for Geographic Education (NCGE), is a firm believer in the value of geography in the classroom. "Geography enables students to understand their world from a local to a global level, make informed decisions about the planet and its resources, and develop critical thinking skills," Kerski said. "Geography addresses today's most pressing issues, including energy, water, biodiversity, climate, natural hazards, and population among others".

Similarly, IMPOFF (2023) points out that geography teaches students about the physical world, including land, air, water, and ecology. It also assists them in comprehending human environments such as societies and communities. This also includes economic, social, and cultural issues, as well as moral and ethical concerns. Aside from that, it teaches students about the interdependence of humans and their environment, particularly in terms of trade, migration, and climate change. This provides students with a sense of place, space, and scale, as well as an understanding of the significance of local, regional, national, international, and global focuses. In addition, geography allows students to integrate their learning across disciplines such as science, humanities, and arts. Geography helps students develop scientific literacy, which will be useful throughout their lives, for example, by applying critical thinking to medical news or decisions. Furthermore, it provides a bridge to the pure sciences by providing an engaging and tangible way of applying its principles, which can open this area up to students who might not have pursued it otherwise. It also instills in students a sense of global citizenship that they can use throughout their lives and careers.

Shirey (2023) added that geography teaches students important skills. That is, students learn to read maps and interpret information at various geographical scales ranging from local to global. They can recognize patterns and solve problems by using data from maps, tables, graphs, and text. Students can also apply critical thinking to understand and deal with current issues of local, national, and international importance by integrating concepts from many different areas of science, social science, and the humanities. Shirey (2023) goes on to say that geography teaches students about the world. As the world's last "superpower" and a major player in international affairs, the United States requires citizens who have a basic understanding of other countries as well as their own. We must also comprehend regional relationships and the role that the United States plays in them.

History is offered to learners to help them become aware of the past, and the present and how the past, and the present shape the future thereby developing the ability to make informed and reasoned decisions for the common good as citizens of a democratic society.

Religious beliefs, according to Jackson (2015), have historically socialized people's behavior and

morality. The teaching of religion in schools is important for preparing children to be responsible, morally sound, and spiritual adults. In addition, religion is a powerful force in the lives of billions of people worldwide. Religious ideas, practices, and power have a profound influence on people. As a result, the study of religion is a fruitful and important field of study. According to Teaching Wiki (2023), religious education is a primary and secondary school subject that aims to develop children's understanding of the world's religions. Children will learn about various religions and their traditions, practices, and beliefs through religious education. In a diverse society, religious education also promotes children's tolerance and mutual respect. The Teaching Wiki (2023) further states that religious education introduces learners to the concept of community service. It teaches children to consider those who are less fortunate. If children are home learning due to unforeseen circumstances, such as the coronavirus outbreak, this is an excellent time to encourage them to consider others and devise ways to assist them in times of need. In short, religious education is the teaching of a specific religion and its various aspects, including its beliefs, doctrines, rituals, customs, rites, and personal roles.

Mathematics, according to Elaine and Jonathan (2021), is at the heart of science and our daily lives. Mathematics is the science that studies the logic of form, number, and arrangement. Mathematics is present in everything we do. It is the foundation for everything in our daily lives, including mobile devices, computers, software, ancient and modern architecture, art, money, engineering, and even sports. Mathematical discovery has been at the forefront of every civilized society since the beginning of recorded history, and mathematics has been used by even the most primitive and earliest cultures. Mathematics became necessary as a result of increasingly complex demands from societies all over the world, which necessitated more advanced mathematical solutions. According to Kyungmee et al. (2008), mathematics is an essential component of human thought and logic, as well as attempts to understand the world and ourselves. Mathematics is an excellent tool for developing mental discipline and for encouraging logical reasoning and mental rigor. Furthermore, mathematical knowledge is essential for comprehending the contents of other school subjects such as science, social studies, and even music and art.

To begin, we must consider why mathematics is so important and distinct from other subjects. That is, what role does mathematics play in the overall school curriculum? As a starting point, we offer some thoughts on why mathematics should be regarded as an important subject in the overall curriculum. Mathematics is interdisciplinary. If we look at the history of education in general, we can see that mathematics (geometry and algebra) was two of the seven liberal arts in both Greek and medieval times. This historical role lends credence to the idea that mathematics has provided the mental discipline required for other disciplines. Next, mathematical literacy is an important characteristic of people who live more effective lives as constructive, concerned, and reflective citizens. Mathematical literacy is defined as having basic computational skills, quantitative reasoning, spatial ability, and many other abilities (Kyungmee et al., 2008). Furthermore, mathematics is used in a variety of fields and disciplines; for example, mathematical concepts and procedures are used to solve problems in science, engineering, and economics. For example, understanding complex numbers is required before learning many concepts in electronics. When compared to the previously mentioned mathematical literacy, the complexity of those problems frequently necessitates relatively sophisticated mathematical concepts and procedures. More importantly, mathematics is part of our

human cultural heritage, and we have a responsibility to preserve it.

Second, because mathematics provides the foundational knowledge and skills for other school subjects such as sciences, art, and economics, among others, the issue of how mathematics is intertwined with other school subjects deserves to be addressed. Mathematics is offered as an 'instrumental subject' in some curricula to supplement the study of other school subjects, while in others, integrated courses that combine mathematics and other fields are offered.

Third, we may wish to consider the number of hours (proportion of hours) and/or courses allotted to mathematics in comparison to other school subjects in each country's curriculum. In addition to this quantitative analysis, data on the qualitative description of school mathematics about other subjects must be collected. Although this comparison does not provide a complete picture of why different countries place such a high value on mathematics, it may spark further discussion.

Relationship between Geography, History, Religious Education, and Mathematics

Under this objective, the study reviewed the literature on the following themes: The relationship between religion and geography, geography and mathematics, as well as religion and mathematics. The first paragraph presents the relationship between religion and geography, the second paragraph looks at the relationship between geography and mathematics. Finally, the third paragraph presents the relationship between religion and mathematics.

Geographers have repeatedly referred to geography's ancient Greek roots to demonstrate that the relationship between religion and geography is not new and that both have had a special relationship since ancient times. For example, Isaac (1965: 2-5) and Gay (1971: 1), cited in Kong (1990), pointed out how Greek geographers' interest in cosmological models, world diagrams, and maps reflected a worldview heavily influenced by religion. Anaximander, the first known Greek mapmaker, is said to have seen the world as a manifestation of a religious principle, namely the inviolability of spatial order, and his diagrammatical efforts to show mathematical proportion in the cosmos and the world map were considered more of a 'religious' than a 'scientific' pursuit. In the mind of the religious person, such concerns linking geography and cosmology lay at the heart of early geography, and in that sense, geography that incorporated religious ideas was evident from the beginning. Furthermore, work relating the two in the sixteenth and seventeenth centuries focused primarily on what Brace et al. (2006) termed ecclesiastical geography, involving primarily the mapping of the spatial advance of Christianity around the world. Such work was motivated by a desire to spread the Christian faith and was greatly aided by the support of Christian churches. Similarly, Huntington (1945) cited in Kong (1990) proposed that geographical factors frequently determined objects of worship; for example, the rain god was one of the most important deities in India because the rain was unpredictable. Hultkrantz's (2010) ecological approach to religion, which tries to show the 'indirect and complicated' way in which the environment influenced religion, is an offshoot of this strictly environmentalist outlook. For example, he argued that the environment provides materials for religious actions and religious conceptions; rites, beliefs, and myths all make use of the natural setting in various ways. Spirits take the form of important animals in society; nature in the afterlife is often thought to resemble nature in the living world, with the obliteration of some traits.

Additionally, religious education is related to geography in the sense that religion, like any other cultural practice, can be evaluated geographically. Geographers investigate the spatial distribution of organized religious systems, specific religious practices, and the impact of religion on cultural and institutional landscapes. According to Christine and Nathan (2023), individual belief and practice in religion are quite nuanced and intrinsic. It is difficult to view specific practices on a global scale, but geographers can categorize and examine major religious trends. Despite geographers' lack of interest in religion, and in geography within religious studies, there are many interesting and important points of contact between the two disciplines. According to Park (2004), spatial variations in religion within and between countries, as well as the global pattern of religion, are interesting in and of themselves because they demonstrate cultural diversity. Such patterns, in general, reflect the interaction of many different factors, and they provide intriguing opportunities for research into the diffusion of ideas, human movement, and population dynamics. Patterns and diffusion of religion reveal interesting properties of human persistence, tolerance, and motivation on a smaller scale. However, the fascination extends beyond people and their belief systems, as it encompasses themes such as sacred space and sacred directions. Religious beliefs also fuel spatially expressed religious practices such as pilgrimage and visits to sacred sites.

On the other hand, geography is related to mathematics in the following ways, according to the Atika School Social Channel (2021): (a) mathematics principles/formulae are used in Geography to calculate distance/areal population density, (b) geography information can be accurately analyzed/presented through the application of mathematical techniques, and (c) geographical concepts are used in mathematics to calculate direction/bearing. According to Anshul (2023), a geographer is a 10-15% mathematician. The author justified this statement by stating that some aspects of statistics and Geographic Information Systems (GIS) in geography involve basic mathematics. But there's no need to be concerned because nothing in it requires knowledge beyond 10th grade. However, you may need to learn a few formulas. Similarly, Ronak (2023) believes that there is some mathematics in geography, but it is mostly about remembering, understanding, and locating skills. However, in terms of mathematics, you will find simple calculations such as percentages for pie charts, bar graphs, and line graphs. If you have mathematics as a subject, geography mathematics will not be a problem for you. Furthermore, Albert (2023) indicates that there is a connection between mathematics and any other science. For starters, no map can be created without calculations, which can become quite complex in detail. Costas (2023) added his perspective by stating that this relationship is central to the mathematics of ancient Egypt and Babylon. Even if they were aware of a theorem, they applied it to solve practical problems. After the Nile flood, they used practical geometry, particularly in ancient Egypt, to determine the boundaries of each piece of land.

Finally, we asked the provoking question. Is mathematics related to religious education? Mathematics and religious education are two separate fields of study that have no inherent relationship. However, the connections and intersections between these two fields can be investigated. The study of religious texts and traditions is one area where mathematics and religious education can intersect. Geometry, numerology, and symbolism, for example, can be found in various religious texts and traditions, and studying these connections can help us understand both mathematics and religion better. Furthermore, the study of mathematics can aid in the development of skills that are useful in the study of religious education. When studying religious texts and traditions, for example, the ability

to analyze and interpret data, think logically and critically, and solve problems can all be useful. Additionally, many religious institutions and organizations may offer courses or programs that combine mathematics and religious education. Some religious schools, for example, may require students to take mathematics courses as part of their curriculum while also incorporating religious teachings.

James (2022) looked into the connection between mathematics and religious education. It was discovered that mathematics education can assist a student in recognizing and comprehending that the universe is ordered by a distinct set of mathematical laws and principles. The universe not only operates but is also made understandable to the human intellect by these principles. As a result, eternal knowledge of mathematics can assist a student in appreciating the harmony and admirable structure present in creation, leading to a heightened appreciation of the need for order, routine, and good habits in their daily life. For these reasons, we believe that a mathematical and religious education can truly prepare a student for a life of true human excellence.

Furthermore, Wahyu (2022) investigates the roles of religious pedagogical principles in the development of teachers' pedagogical values and proposes a value-based approach that includes the principles as a catalyst to reform mathematics education in Madrasa. The findings suggest that a values-based approach to reforming mathematics education in Madrasas is an option. The approach is based on value theories in mathematics education, particularly the importance of pedagogical values in guiding teachers' instructional practices, as well as empirical evidence on the relationship between teachers' beliefs in mathematics teaching and learning and classroom practices. This encouraging result has motivated the current study to be carried out in Kenya, an African country, whereas Wahyu (2022) was carried out in Indonesia, an Asian country.

Yip and Ngai-Ying (2014), on the other hand, investigated the relationship between teachers' religions and their beliefs about mathematics teaching and learning in Hong Kong. Semi-structured interviews with mathematics teachers from various religious backgrounds were used to collect data on teachers' perceptions of the relationship between their personal religious beliefs and their beliefs about teaching and learning mathematics. In-depth analyses of three mathematics teachers' perceptions reveal a complex relationship between teachers' religious beliefs and their teaching beliefs. First, different religions share some values that influence beliefs about mathematics teaching and learning, as well as education in general. Second, religion is a complex belief system, and teachers appear to use only a subset of their religious beliefs to guide their instruction. A teacher may also be influenced by more than one religion or cultural tradition. This encouraging result prompted the current study, which was conducted in Kenya using a library study as a data collection method. This will allow the current study to collect additional perspectives on the relationship between mathematics and religious education.

Overall, while there is no direct relationship between mathematics and religious education, there are numerous opportunities for these two fields to intersect and complement one another.

Methodology

The methodology of this study was a systematic literature review. The study used a purposive sampling procedure to collect the data. Six procedures of the systematic literature review were formulated and used in the study after thoroughly reading and analyzing some sources on the literature review: (1) determining the aims of the systematic literature review, (2) determining the research topics, (3) planning a literature search, (4) searching and screening the literature, (5) analyzing the screened literature, and (6) synthesizing the results of the analysis. By following those steps, the researchers feel more confident in organizing this literature review. Mendeley Library was used as the database for this study because it is one of the leading databases that contain bibliographic documents with full-text articles in various disciplines, particularly for educational multidisciplinary research (Gusenbauer & Haddaway, 2020). The literature was chosen to be in English. Furthermore, to enable the study to explore many articles, this study used scholarly works from 1945 to 2023 to select 25 out of over 100 articles related to the research objectives. This is justified by their potential to enrich our understanding through historical contextualization, cumulative knowledge accumulation, longitudinal analysis, inclusivity, diversity, and methodological rigor. This comprehensive approach enables a more nuanced study of the subject, improves the validity and dependability of our findings, and helps the growth of scholarly discourse in the field. All articles published before 1945 were barred from consideration. Content analysis was used to validate the selected articles. Finally, this study used qualitative synthesis methods such as content analysis to answer the research questions and present the findings in the next section.

Findings

The study established the following on the importance of Geography, History, Religious Education, and Mathematics in the National Curriculum. According to the reviewed literature, the following are some of the benefits of studying geography: Geography assists learners in developing mental skills, understanding/appreciating various environmental influences, encouraging international awareness/cooperation, assisting learners in appreciating important social values such as time management/responsibility, assisting learners in developing positive attitudes toward resource protection/conservation, leading to the development of career opportunities, assisting learners in managing time properly, and enabling learners to explain the origin/fate of various phenomena. These findings corroborate (the Atika School Social Channel, 2021; IMPOFF, 2023; Kerski, 2011; Shirey, 2023). This result is encouraging because it implies that geography provides students with a diverse set of skills and helps them develop personally. As a result, students would have significant gaps in their knowledge, capabilities, and understanding if they did not study geography.

History enables learners to develop into responsible national and global citizens of democratic society while Religious education assists students in socializing their behavior and morality, as well as preparing children to be responsible, and spiritual adults. These findings corroborate Jackson's (2015).

Mathematics is the language in which science is written. Mathematics is also extremely useful in business and society. Mathematics is also a way of thinking in that it solves problems using abstract reasoning. Participation in the knowledge economy and public decision-making requires

it. Mathematics gives learners powerful tools for describing, analyzing, and changing the world. These findings are supported by Elaine and Jonathan (2021). Furthermore, Mathematics is an important part of human thought and logic, as well as our attempts to understand the world and ourselves. Mathematics is an excellent tool for encouraging logical reasoning and mental rigor as well as developing mental discipline. Furthermore, understanding the contents of other school subjects such as science, social studies, and even music and art requires mathematical knowledge. These findings are in line with Kyungmee et al. (2008).

Relationship between Geography, History, Religious Education, and Mathematics

Developing an inquiring mind allows students to explore and investigate the world for themselves, past, present, and future. Events and human experiences are complex, and they can be perceived, interpreted, and represented in a variety of ways. Our natural environment is diverse and dynamic, influenced by physical processes as well as human actions. Human societies are complex and diverse, and human actions and beliefs shape them. Informed, self-aware citizens engage with humanity's challenges and opportunities and are capable of taking deliberate, ethical, and long-term action. Therefore, there is a need for an interdisciplinary approach to education.

According to the findings of the literature review, religion is related to geography. Religion, like any other cultural practice, can be evaluated geographically. First, geographers investigate the spatial distribution of organized religious systems, specific religious practices, and the impact of religion on cultural and institutional landscapes. Geography affects not only where specific religions or belief systems, such as the world's major faiths, are located, but also how those beliefs are practiced and the behaviors that they encourage. These findings are in line with those of (Christine & Nathan, 2023; Brace et al., 2006; Park, 2004; Kong, 1990), while History demonstrates how various disciplines have evolved.

The relationship between religion and mathematics. In various contexts, the relationship between mathematics and religious education has been investigated. Some researchers have found a natural link between mathematics and religious education, implying that religious education can help students achieve their mathematical potential (James, 2022). On the other hand, geography and mathematics are related, according to the reviewed literature, because (a) mathematical principles/formulae are used in geography to calculate distance/areal population density, (b) geography information can be accurately analyzed/presented through the application of mathematical techniques, and (c) geographical concepts are used in mathematics to calculate direction/bearing. These findings are consistent with those of (the Atika School Social Channel, 2021; Albert, 2023; Anshul, 2023; Costas, 2023; Ronak, 2023).

Conclusion

This study investigated the importance and relationship between GHREM. We aimed to excite learners, the Ministry of Education, and other education stakeholders about the importance and relationship between these learning areas. We see these subjects as critical to the learners' development as well-rounded, global citizens, equipped with a diverse set of skills and interests that will enable them to thrive in whatever field they choose to pursue in the future. Based on the

relationship between geography, history, religious education, and mathematics, we see that they are four distinct fields of study, but they are interrelated and interdependent.

Recommendation

Based on the study's findings, though these subjects are taught without linking them, this study recommends that GHREM be integrated allowing their permeation across all levels of education in the spirit of CBC which encourages linkage among all learning areas. This will allow learners to grow into well-rounded, global citizens with a diverse set of skills and interests that will allow them to thrive in whatever field they choose to pursue.

References

- Albert, V. V. (2023). *What is the relationship of mathematics and geography?* Quora. https://www.quora.com/What-is-the-relationship-of-mathematics-and-geography?no_redirect=1
- Anshul, G. (2023). *How much mathematics is involved in geography?* JetBrains. <https://www.quora.com/How-much-mathematics-is-involved-in-geography>
- Atika School Social Channel. (2021). *KCSE Geography Paper 1 2012 Section A Question 1*. AtikaSchool.Org on our Social Channels. <https://www.atikaschool.org/geography-topical-questions-and-answers/what-is-the-relationship-between-geography-and-mathematics#gsc.tab=0>
- Brace, C., Bailey, A. R., & Harvey, D. C. (2006). Religion, place, and space: A framework for investigating historical geographies of religious identities and communities. *Progress in Human Geography*, 30(1), 28–43. <https://doi.org/10.1191/0309132506ph589oa>
- Christine, R., & Nathan, B. (2023). *Religion and geography* (First Edition). Pressbooks. <https://viva.pressbooks.pub/humangeog/chapter/geography-of-religion-sacred-spaces/#:~:text=Religion%2C%20like%20any%20other%20cultural,landscapes%20of%20culture%20and%20institutions.>
- Costas, D. (2023). *What is the relationship between practical geography and mathematics?* Quora. https://www.quora.com/What-is-the-relationship-of-mathematics-and-geography?no_redirect=1
- Elaine, J. H., & Jonathan, G. (2021). *What is mathematics?* (First Edition). Live Science Contributor. <https://www.livescience.com/38936-mathematics.html>
- Great Schools Partnership. (2014). *The glossary of education reform for journalists, parents, and community members* (First Edition). Great Schools Partnership. <https://www.edglossary.org/COMPETENCY-BASED-LEARNING/>
- Gusenbauer, M., & Haddaway, N. R. (2020). Which academic search systems are suitable for systematic reviews or meta-analyses? Evaluating retrieval qualities of Google Scholar, PubMed, and 26 other resources. *Research Synthesis Methods*, 11(2), 181–217. <https://doi.org/10.1002/jrsm.1378>
- Holt, J. (2009). *What is geography?* https://in.sagepub.com/sites/default/files/upm-assets/29045_book_item_29045.pdf

- Houghton, D. D. (2002). *Introduction to climate change: Lecture notes for meteorologists* (First Edition). World Meteorological Organization. <https://digitallibrary.un.org/record/474508?ln=en>
- Hultkrantz, Å. (2010). An ecological approach to religion. *Journal of Anthropology*, 31(1), 131–150. <https://doi.org/10.1080/00141844.1966.9980980>
- IMPOFF. (2023). *Importance of geography in education, human life, and history* (First Edition). WordPress. <https://impoff.com/importance-of-geography/>
- Jackson, R. (2015). *Religion, education, dialogue and conflict: Perspectives on religious education research* (First Edition). Routledge. <https://www.routledge.com/Religion-Education-Dialogue-and-Conflict-Perspectives-on-Religious-Education/Jackson/p/book/9781138814509>
- James, H. T. (2022). *How a mathematics and religious education can help a student to prepare for a life of excellence*. LinkedIn. <https://www.linkedin.com/pulse/how-mathematics-religious-education-can-help-student-prepare-tran>
- Kenya Institute of Curriculum Development (KICD). (2013). *The Kenya Institute of Curriculum Development Act No. 4 of 2013*. Ministry of Education. <https://kicd.ac.ke/about-us/background-history/#:-:text=KIE%20was%20established%20in%20April,%2C%20Kenya%2C%20in%20January%201964.>
- Kerski, J. (2011). Why geography education matters. In *Au Summer 2011 esri.com* (First Edition, pp. 62–63). The University of Redlands. <https://www.esri.com/news/arcuser/0611/files/geomatters.pdf>
- Kong, L. (1990). Geography and religion: Trends and prospects. *Progress in Human Geography*, 14(3), 355–371. <https://doi.org/10.1177/030913259001400302>
- Kyungmee, P., Aarnout, B., Joana, B., & Lynn, A. S. (2008, July 7). *The role of mathematics in the overall curriculum*. International Commission on Mathematical Instruction Regional Conference. <https://www.mathunion.org/icmi/role-mathematics-overall-curriculum>
- Murphy, A., B. (2014). Geography's crosscutting themes: Golden anniversary reflections on 'the four traditions of geography. *Journal of Geography*, 113(5), 181–188. <https://doi.org/doi:10.1080/00221341.2014.918639>. S2CID 143168559
- Park, C. (2004). Religion and geography. *Routledge*, 1–29. <https://www.lancaster.ac.uk/staff/gyaccp/geography%20and%20religion.pdf>
- Pattison, W. D. (1964). The four traditions of geography. *Journal of Geography*, 63(5), 211–216. <https://doi.org/doi:10.1080/00221346408985265>
- Richard, H., Simon, H., & Richard, M. (2012). *Cross-curricular teaching and learning in the secondary school: Humanities such as history, geography, religious studies, and citizenship* (Second Edition). Routledge, Taylor & Francis Group. https://books.google.co.ke/books?hl=en&lr=&id=DGirAgAAQBAJ&oi=fnd&pg=PP1&dq=what+is+the+relationship+between+mathe+maths,+geography+and+Christian+Religious+Education+&ots=g9-p_GhUlj&sig=SXHh4hJZ5Hf1w0jY17kOqJEk_vQ&redir_esc=y#v=onepage&q&f=false
- Robinson, L., J. (1976). A new look at the four traditions of geography. *Journal of Geography*, 75(9), 520–530. <https://doi.org/doi:10.1080/00221347608980845>.

- Ronak, A. (2023). *Is mathematics in geography difficult?* Quora. https://www.quora.com/What-is-the-relationship-of-mathematics-and-geography?no_redirect=1
- Shawn, D. (2019). *Assessing competency-based education* (First Edition). Victory Educational Group Limited. <https://victoryprd.com/blog/assessing-competency-based-education/>
- Shirey, R. I. (2023). *Importance of geography*. Scribd Inc. <https://www.scribd.com/document/415359076/The-importance-of-geography-docx>
- Teaching Wiki. (2023). *What is RE (Religious Education)?* (First Edition). twinkl. <https://www.twinkl.co.ke/teaching-wiki/re-religious-education>
- TeachThought Staff. (2023). What is competency-based learning? *TeachThought Publication Limited*. <https://www.teachthought.com/learning/what-is-competency-based-learning/>
- Tuan, Y. F. (1976). Humanistic geography. *Annals of the Association of American Geographers*, 66, 266–276. <http://dx.doi.org/10.1111/j.1467-8306.1976.tb01089.x>
- Wahyu, K. (2022). *Exploring the roles of religious beliefs to value mathematics education: An alternative to the Madrasa reform?* 633, 49–57. <https://doi.org/10.2991/assehr.k.220104.009>
- Wikipedia, the free encyclopedia. (2023). *Geography*. Wikipedia. <https://en.wikipedia.org/wiki/Geography>
- Yip, C. C., & Ngai-Ying, W. (2014). Worldviews, religions, and beliefs about teaching and learning: Perception of mathematics teachers with different religious backgrounds. *Educational Studies in Mathematics*, 87(3). <https://doi.org/DOI:10.1007/s10649-014-9555-1>
- Zutaah, P., Miheso-O'Connor, M. K., & Ondigi, S. R. (2022). Pre-service teachers' performance in geometry in the colleges of education, Ghana. *Journal of the European Teacher Education Network*, 23–47. <https://etenjournal.com/2022/06/20/3307/>