

**THE RELATIONSHIP BETWEEN CONSTRUCTIVE  
SIMULATION, CONVENTIONAL METHOD AND LEARNING  
OUTCOMES OF CHRISTIAN RELIGIOUS EDUCATION. THE  
CASE OF EMBU COUNTY, KENYA**

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AND EDUCATIONAL TECHNOLOGY OF THE UNIVERSITY  
OF EMBU**

**OCTOBER, 2024**

## DECLARATION

This thesis is my original work and has not been presented elsewhere for a degree or any other award.

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## **DEDICATION**

This work is dedicated to my remarkable son, Liam Mwenda, and my loving parents, Joshua Kanake and Rose Mwendwa.

To my dear son, Liam: You are the blessing that has revealed my tenacious side. My commitment to being a worthy role model and mother to you has been the driving force behind my passion, hard work and commitment to my academics.

To my amazing parents, Joshua and Rose: Your patience, sacrifice and understanding have inspired me to strive to be the best version of myself. Your immeasurable and unwavering love, support, motivation and prayers have sustained me throughout my educational journey, especially during moments when I felt like giving up. You have played an integral role in shaping who I am today. Blessings abound, my beloved parents.

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## **LIST OF ACRONYMS AND ABBREVIATIONS**

<b>BPS</b>	: Board of Post-Graduate Studies
<b>CRE</b>	: Christian Religious Education
<b>KCSE</b>	: Kenya Certificate of Secondary Education
<b>KICD</b>	: Kenya Institute of Curriculum Development
<b>KNEC</b>	: Kenya National Examinations Council
<b>LOS</b>	: Lesson Observation Schedule
<b>MoE</b>	: Ministry of Education
<b>NACOSTI</b>	: National Council for Science, Technology and Innovation
<b>NERDC</b>	: Nigeria Educational Research and Development Council
<b>SPSS</b>	: Statistical Package for Social Sciences

## OPERATIONAL DEFINITION OF TERMS

- Attainment** : The extent to which learners achieve learning outcomes.
- Conceptions** : People's attitudes or beliefs towards an idea, object or person that influences their behaviour towards that idea, object or person.
- Constructivism** : A theory that states that knowledge is constructed by learners as opposed to learning passively.
- Constructive simulation:** A learner-centred approach to teaching which involves the use of prior experiences to imitate real abstractions, situations, characters or processes as closely as possible in order to facilitate construction of new knowledge.
- Conventional method** : Teacher-centred approach to teaching which entails lecture method of instruction, and where the teacher is perceived as the primary source of knowledge.
- Learning outcomes** : Descriptions of the knowledge and skills learners ought to acquire by the end of a unit of instruction, while enabling them understand why they will benefit from that knowledge and skills.
- Effective learning** : Teaching and learning that actively engages learners in both their learning and personal development.
- Simulation** : A concept in teaching and learning which imitates real life situations, characters and things as closely as possible so as to demonstrate the ultimate effect of a particular action.

## ABSTRACT

Learning outcomes in Christian Religious Education are attributed to the teaching and learning approaches utilized by teachers. In Kenya, conventional methods are prevalent in classrooms, as teachers often prefer methods that alleviate their workload. Nevertheless, the implementation of learner-centred methods such as constructive simulation enhances learning outcomes. Although numerous researchers have advocated for the constructive simulation method as a means to promote interactive education across various subjects, there remains scarcity of research in the context of Christian Religious Education. Therefore, this study established the relationship between constructive simulation, conventional method and learning outcomes of CRE. This was done by evaluating the dissimilarity in learning outcomes and conceptions of CRE learners instructed by constructive simulation, and those instructed using a conventional approach. This research adopted a mixed method approach where, a Quasi- experimental research design with groups under treatment and control to collect quantitative data, while the descriptive research design was utilized to collect qualitative data, guided by Vygotsky's social cognitive theory and John Dewey's philosophy of reflective practice. In total, 108 form two CRE learners in sub-county secondary schools were purposively selected for the study. Data were collected using the Learner Attainment test in CRE as the assessment tool, student questionnaires, and lesson observation schedules. The research utilised correlation analysis, *t*-test and regression statistical models to establish the effectiveness of the two teaching methods, as well as the relationship between learners' conceptions and their learning outcomes in CRE. Results from the *t*-test revealed that, constructive simulation ( $t_{(49)} = -9.76$ ,  $n = 50$ ,  $p < 0.05$ ) significantly outperformed the conventional method of teaching ( $t_{(39)} = 2.700$ ,  $n = 40$ ,  $p < 0.324$ ), demonstrating that constructive simulation was more effective in enhancing learning outcomes in CRE. The correlation and regression analysis indicated a positive link between the two assessment tests of learners taught using constructive simulation ( $r = .510$ ,  $p < 0.01$ ) and conventional methods ( $r = .673$ ,  $p < 0.01$ ). Furthermore, learners' conceptions of constructive simulation ( $\beta = 0.252$ ,  $p < 0.00$ ) and conventional method ( $\beta = 0.065$ ,  $p < 0.01$ ) had a positive relationship with learning outcomes of CRE. The study therefore ascertained the relationship between constructive simulation and learning outcome as operative. Moreover, learners' conceptions of teaching methods had an impact on their learning outcome. From the study findings, constructive simulation was more effective in enhancing learning outcomes as opposed to the conventional method. These findings are pertinent for a diverse range of stakeholders, including educators, policymakers, and scholars advocating for evidence-based approaches like constructive simulation in education. The results, therefore, suggest when designing curricula and formulating educational policies, educators and policymakers should incorporate constructive simulation as a learner-centred method.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background to the study

The CRE curriculum encompasses a broad spectrum of concepts, principles, and skills, all of which are influenced by the learners' environment (Otieno, 2021). CRE holds a distinctive responsibility for impacting values because its content and approach are centred on value and skill acquisition grounded on the Bible (Murundu et al., 2022; Nawose et al., 2023). This subject is tasked with guiding learners in understanding values from a religious standpoint, aiding in acquisition of social and moral insights necessary for making sound moral choices in life (KICD, 2019). The KICD report further states that in the Kenyan form two curriculum, the Gospel of Luke holds significance due to its rich content concerning the moral values and skills crucial for learners, despite a worrying decline in learning outcomes. Additionally, there is a growing negativity among CRE learners towards this subject, viewing it as preachy and dull (Gitiha et al., 2024). As a result, objectives of CRE, particularly regarding the Gospel of Luke, remains largely unrealized, and this may be attributed to pedagogy in terms of the instructional methods employed by teachers (Saoke et al., 2022; Situma, 2016). Effective learning of these essential values and skills requires active engagement in the learning process, suggesting a shift from theoretical teaching approaches to practical methods that directly instil the desired values and skills in learners (Odundo & Gunga, 2013).

Constructive simulation is a form of instruction which centralizes the learner throughout the teaching discourse by integrating the principles of constructivist learning theory with a simulation-driven instructional model (Okeke, 2015). Several researchers globally have indicated the relevance of Constructive Simulation as an instructional technique. A study carried out in Pakistan on 'The role of Constructive simulation towards students' academic performance' concluded that, students taught using Constructive Simulation outperformed those who were taught using the lecture method (Bakhsh et al., 2020). The implication was that Constructive Simulation enhanced students' achievement and consequently performance. This study further established that the majority of teachers do not evaluate their teaching practices or

use methods that encourage students' engagement with learning activities and their learning environment. The study therefore argued that achievement could be improved by employing an effective instructional strategy.

To further affirm these findings, a study by Hyslop-margison and Strobel (2007) demonstrated that constructivism recognizes the importance of interaction between the teacher and learners while catering for individual learners' differences. A learner's ability to construct knowledge is founded on encounters in the learning environment and their capacity to interpret and connect these experiences to what they learn (Reich, 2007). Active learner participation improves attention to the subject matter and consequently improves learning outcome (Sutinen & Mead, 2007). Moreover, simulation enables learners visualize the content they learn and as a result, understand better and improve their logical thinking while finding solutions to real life situations (Goi, 2019; Hubalovsky, 2015; O'Regan et al., 2016). This infers that learning outcomes are improved through learner engagement which constructive simulation advocates.

Okeke (2015) conducted a study in Nigeria on the 'Effects of Constructive Simulation teaching strategy on students' achievement and retention'. The study considered influence of gender on students' academic achievement and retention. The findings of the study were that constructive simulation has significant effect on both the achievement as well as the retention of content by learners and that the method used by teachers in instruction greatly influences learners. Further results from the study proved that gender had significant effect on students' achievement while gender and method failed to have significant influence students' retention. Constructive simulation, therefore, facilitates reflection on experiences that apropos of teaching-learning situations and learn from them. Other researchers through their studies obtained findings that, constructivism encompasses the use of relevant methods in teaching and learning in an attempt to make teaching more effective (Makgato, 2012; Ogheneakoke et al., 2019). These findings suggest that constructive oriented methods have been argued to improve learners' outcome. Studies on simulation inferred that, it enables learners to practically apply the knowledge and skills they acquire while

assuming specific roles (Ogbonna, 2016; Sierra, 2020). This largely engages the learner hence bringing out better learning outcome.

In Kenya, a study conducted by Mwanda et al. (2017) established that learning is underpinned on the ideals that the learner, grounded on learner's internal mental process, constructs knowledge. Learners are provided with opportunities for free expression, collaboration, and idea exchange with their peers, which enhances their outcomes (Nyakito, 2018). Odundo and Gunga (2013) further concluded that, in order to attain good outcome, the teacher should scaffold the learning process for learners to gain confidence hence effective learning. Contrarily, conventional methods revolve around a teacher-centred approach where the teacher is at the core of all classroom activities, encompassing explanations and discussions (Ahmad et al., 2017). Nevertheless Ndwiga and Odundo (2020) established that these methods exhibit several drawbacks, including inadequate planning, overwhelming content delivery, a lack of innovation, and inconsistency in lesson delivery. These issues ultimately result in disengaged, bewildered, and less motivated learners, leading to subpar learning outcomes (Nguyen & Austin, 2018).

Conventional methods come with several limitations, as they tend to discourage inquiry and confine learners to passive roles as mere recipients of information in the classroom (Kassem, 2018). Furthermore, they promote a superficial sense of learning through rote memorization, which does not necessarily translate into the ability to apply acquired knowledge during assessments (Chuang, 2021). However, in recent years, there has been a significant shift in the role of the teacher towards that of a facilitator, guiding learners throughout their educational journey (Koross, 2016). The diminishing effectiveness of conventional methods in terms of learning outcomes has spurred a growing need for the adoption of learner-centred approaches to enhance learners' acquisition of knowledge and skills (Lavi et al., 2021).

Numerous policies, documents and studies have underscored the significance of proper pre-service and in-service training for teachers to guarantee pedagogical competence (Elfert, 2019; KICD, 2019; UNESCO, 2019a, 2019b). Enhancing competence allows teachers augment their proficiency and skills in developing

teaching materials and utilizing various teaching methods throughout the educational process (Rahman, 2014; Saoke et al., 2023). A study by Dami et al. (2023) revealed that, a teacher's competence is assessed based on their grasp of subject matter, pedagogical knowledge, skills, conceptions, conduct and commitment towards learners. In particular, certified and knowledgeable CRE teachers are expected, as part of their core responsibilities, to possess sufficient knowledge of the subject content and the ability to create suitable teaching and learning experiences (Itolondo, 2012; Mayende, 2022; Situma, 2016). Consequently, the pedagogical competence of a CRE teacher can significantly impact learners' acquisition of values and skills, ultimately influencing their learning outcomes (Othoo & Aseu, 2022; Saoke et al., 2022).

While this research primarily focused on constructive simulation and conventional methods of teaching, it is important to acknowledge that gender dissimilarities influence learning outcomes. Okeke (2015) explained that the interaction of gender with the method of teaching contributes to poor learning outcomes in religious education. In light of the above, research in the area of gender and its influence on learning outcomes when learners are taught using learner-centred and teacher-centred methods was desirable. The aforementioned arguments prompt a discussion on which teaching methods, learner-centred or teacher-centred, are more effective in achieving desirable learning outcomes in CRE (KNEC, 2019). Various researchers have explored and confirmed the impact of learner-centred methods such as flipped classrooms, activity-based teaching, cooperative learning, and inquiry-based learning when compared to conventional teaching methods (Cheng et al., 2019; Erbil, 2020; Forman & College, 2019; Magfirah et al., 2019).

Shah (2019) and Srikoon et al. (2018) further suggest that to improve the learning outcomes of CRE as a valuable subject, it is essential to incorporate learner-centred methods. This approach complements conventional method and ultimately enhances learning outcomes in CRE (Chuang, 2021). As a result, this study introduced an innovative and learner centred pedagogical framework known as Constructive simulation and compared it to the conventional method of teaching in a bid to derive a conclusion on the effectiveness of the two methods of teaching in enhancing

learning outcome. The theoretical inferences, Vygotsky's social cognitive theory and John Dewey's philosophy of reflective practice, are commonly linked to pedagogical research, providing insights into the impact of constructive simulation and conventional method on learning outcomes (Bakhsh et al., 2020; Irfan & Bakhsh, 2023). As a result, the aim of this study was to assess the influence of constructive simulation and conventional method in enhancing learning outcome in CRE.

## **1.2 Statement of the Problem**

Methods of teaching are a major contributor to poor outcome in CRE (Filho et al., 2018; Ndwiga et al., 2020; Odundo & Gunga, 2013). Teaching of Christian Religious Education should not only equip learners with knowledge but also the right skills and attitudes needed to ensure they are holistic individuals. Learners can only acquire these skills if they are actively engaged in the learning process through use of learner centred methods of teaching. However, conventional instruction characterized by teacher-led lectures predominate classroom practices in Kenya (Gitiha et al., 2024; Saoke et al., 2022). These practices are ineffective and thus, it is critical to adopt constructive simulation as a learner centred method, in order to improve learning outcome in CRE. Although numerous researchers have advocated for the constructive simulation method as a means to promote interactive education across various subjects, there remains scarcity of research in the context of Christian Religious Education, particularly concerning the Gospel of Luke. A notable gap exists regarding its adoption and pedagogical implementation in teaching of the Gospel of Luke, which is crucial in achieving CRE objectives, yet learning outcomes in this area are deficient. To address this pedagogical and methodological gap, this study examined four topics within the Gospel of Luke with the aim of improving learning outcomes. These topics include Infancy and early life of Jesus, Jesus and John the Baptist, Galilean Ministry, and The Sermon on the Plain.

### **1.3 Research Objectives**

This study was guided by the general and specific objectives.

#### **1.3.1 General Objective**

The focal objective of the study was to ascertain the influence of constructive simulation and conventional on learning outcome of Christian Religious Education in Sub County secondary schools in Embu County.

#### **1.3.2 Research Objectives**

The objectives of the study were:

- i. To evaluate the difference in the mean scores of learners taught using constructive simulation and conventional method.
- ii. To assess the difference in the mean scores of male and female learners taught using constructive simulation and conventional method.
- iii. To establish the relationship between learners' conceptions of the method employed in teaching and their outcome in Christian Religious Education.

### **1.4 Research Hypotheses**

From the foregoing objectives, the study will seek to test the following research hypotheses:

H<sub>01</sub>: There are no statistically significant differences in the mean scores of learners taught using constructive simulation and conventional method.

H<sub>02</sub>: There are no statistically significant differences in the mean scores of male and female learners taught using constructive simulation and conventional method.

H<sub>03</sub>: There is no statistically significant relationship between learners' conceptions of method employed in teaching and their learning outcome in Christian Religious Education.

### **1.5 Justification of the Study**

Outcome in CRE is of keen interest to not only learners but also teachers, stakeholders in education and the society. The choice of Embu County was informed by the fact that Embu County was one of the counties affected by the fluctuating outcome in

Christian Religious Education hence providing a good location of study (CDE Annual report, 2021). In Kenya, studies have focused on constructivism, but few studies conducted on the adoption and pedagogical implementation of constructive simulation in the context of Christian Religious Education, particularly concerning the Gospel of Luke, which is crucial in achieving CRE objectives is notably insufficient. Although teachers have a variety of methods to choose from in lesson delivery, they often fall back methods such as conventional methods that lessen their workload (Njagi, 2016). Furthermore, teachers' beliefs, attitude and personal preferences influence the decisions they make and the teaching method they utilize in teaching (Palak & Walls, 2009). This is due to need by the teaching and learning strategies to meet both time and content demands of the curriculum (Dole et al., 2015). However, Situma (2016) acknowledges that the conventional method is viewed as easier in teaching in regard to a teacher's preparation but is not effective in enabling learners understand and retain content taught. In light of this, Mwanda et al. (2017) recommends more constructive oriented studies that integrate both qualitative and quantitative data collection methods to draw well-informed conclusions. Consequently, this study ascertained the influence of constructive simulation and the conventional method on learning outcomes. Additionally, the study assessed the relationship between conceptions of the two methods utilised in teaching and learning outcome in CRE within the context of Embu West Sub-County.

### **1.6 Significance of the Study**

CRE holds a distinctive responsibility for impacting and guiding learners in understanding values from a religious standpoint, aiding in acquisition of social and moral insights necessary for making sound moral choices in life because its content and approach are centred on value and skill acquisition grounded on the Bible. A recent gradual shift to the Competency Based Curriculum (CBC), learner centred methods have been emphasized in classroom practices. Therefore, this study has a practical significance for learners, educators, Ministry of Education and curriculum developers, scholars and researchers, and the society, which will benefit.

The findings of this study encourage peer interaction and exchange of ideas among learners therefore resulting in greater attainment of knowledge, creativity, skills and

collaborative learning. Through the findings of this study, teachers will acquire a valuable tool to recognize the importance of fostering a constructive learning environment that promotes active student participation, democratic practices, and interaction. In addition, educators are motivated to scaffold while teaching and readily adapt to changes in methods of teaching in order to attain effective teaching. Furthermore, the study will be critical in teacher professional development since it will motivate the teachers to attend seminars and workshops where they receive training on skill enhancement and how to enhance teaching methods and improve learning outcomes.

The Ministry of Education and Kenya Institute of Curriculum Development (KICD) will get empirical evidence on the effectiveness of construction simulation on learning outcome in Christian Religious Education. In line with this, curriculum developers are challenged to consider learners' varied abilities and conceptions while planning the curriculum. This will motivate recommendation of constructive simulation as a more effective teaching method in CRE as well as other subjects, to educators and policy makers as an introductory policy in the Kenyan Education System as is done in certain developed countries. Additionally, researchers will get a reference point for evaluation of the first-hand study of related literature. Finally, the conclusions of this study will serve the society as a whole because when a learner achieves academically and makes sound moral values then there is bound to be development in the society.

### **1.7 Assumptions of the Study**

The study assumed that the CRE teacher in treatment group was trained to use Constructive Simulation. The assumption was that the Christian Religious Education teacher in treatment group would appropriately apply the method in teaching. Moreover, it was assumed that there would be no interaction between the teachers in the two schools to avoid interference with the intervention and control groups. In addition, it was anticipated that the participants would remain in their respective schools throughout the study period. Lastly, the assumption was that the effect on learning outcome would be a result of the teaching methods utilised and conceptions of these methods.

### **1.8 Limitation of the Study**

This study did come with certain limitation. Potential bias in the findings may arise due to differential attrition in the response rates across the treatment and control conditions. The attrition was attributed to variation in school dropout rates and inconsistencies in school attendance across the two groups.

### **1.9 Delimitation of the Study**

The study only considered the impact of two methods of teaching and conceptions on learning outcomes of learners. Therefore, other school characteristics that were not accounted for in the analysis were not considered.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

This chapter contains review of extant literature, theoretical framework and the conceptual framework, summary of pragmatic literature, and research gap successively.

#### 2.2 Concept of Constructive Simulation

Constructive simulation is a teaching method that combines the aforementioned two concepts, that is, constructive instruction and simulation model in the teaching learning process (Bakhsh et al., 2020; Okeke, 2015). Constructive simulation also supports learning as an active process, allowing learners build knowledge by discovery principles, concepts and facts on their own (Ogbonna, 2016). Obiekwe (2008) posits that constructive teaching entails active learner participation in the teaching learning process. Learning occurs through use of a simulator which results in making learning as close as possible to reality (Aldrich, 2003; NERDC, 2018) .

The constructivist theory proposes that learners come into the learning environment with pre-existing knowledge and then build upon it as they seek to make sense of new experiences (Hyslop-margison & Strobel, 2007; Mwanda et al., 2017). Drawing from their prior experiences, learners endeavour to emulate real-world concepts, situations, or activities as close as feasible to create new insights (Mwanda et al., 2017). As new ideas and information are integrated into fundamental knowledge and skills that form the basis of the discussion, the learner can organize this new knowledge in a way that becomes distinct to their own thinking (Makgato, 2012; Reich, 2007; Odundo & Gunga, 2013). Constructivism can be utilized to comprehend the learning and growth of learners as well as the reflective ability of the instructor and use tools and activities that promote problem solving and thinking skills (Brown, 2005; Sutinen & Mead, 2007). This ensures learning is interactive as opposed to direct instruction while equipping the learners with greater cognitive skills as well as affective and meta-cognitive abilities that empower learners to cope in the real world (Nwafor, 2007; Tangney et al., 2001).

Simulation, on the other hand, is a straightforward yet effective learning strategy that embeds practical experience within a contextual framework, thereby enhancing the acquisition of knowledge - that is the primary goal of education (Goi, 2019). Simulation entails the process of artificially constructing central features of reality in a bid to study and build something that exists in reality (Bakhsh et al., 2020; NERDC, 2008; Rettberg, 2004). As postulated by Goi (2019); Hubalovsky (2015) and O'Regan et al. (2016), simulation is hinged on a straightforward but effective learning strategy which integrates practice into context and enhances critical thinking skills, behaviours and knowledge acquisition which is the primary aim of teaching CRE. Learners are therefore expected to address the concerns and difficulties that emerge while experiencing the repercussion of their decision (Gredler, 2004; Ogheneakoke et al., 2019). Simulation-based teaching and learning emphasizes substantial collaboration between educators and learners, involving hands-on practice within the learning discourse, ultimately leading to improved learning outcomes (Sierra, 2020; Usherwood, 2014). Simulation is therefore an effective tool in teaching and learning of Christian Religious Education due to their ability to boost both student engagement as well as motivation as posited by (Kallestrup, 2018; Okeke, 2015).

When employing constructive simulation, learners, guided by the teacher, strive to replicate real-life situations, concepts, or processes as meticulously as possible, resulting in the construction of new knowledge through experiential learning (Jančič and Hus, 2019). This approach places the learner at the centre of learning and can take the form of games, narrations, role-playing, and inquiry thus actively engaging learners while reinforcing their understanding (Milad, 2023). In a constructive simulation classroom, the role of the teacher is to facilitate and create a democratic and inclusive environment while allowing learners own the learning discourse and guiding them to acquire skills hence produce new knowledge (Bolton, 2010). Furthermore, the learner is recognized as a distinct individual with existing knowledge, unique needs, and personal experiences (Kim, 2005). Constructive simulation has an immense effect on learning activities and consequently on learners ability to understand and retain the content taught in CRE (Aldrich, 2003; Goldenberg et al., 2005). Learners exposed to accelerated learning are likely to acquire better

outcome compared to those who are taught using conventional method. In view of the foregoing, the concepts of constructivism and simulation instructional model gives rise to constructive simulation which is arguably an effective teaching method that improves learning outcome (Iqbal, 2020; Shams et al., 2019).

### **2.3 Constructive Simulation Instructional Model versus Conventional Method**

Constructive simulation relies on the teacher as a facilitator for learners who come into the learning environment with prior knowledge and seek to build on it by replicating real-life situations, concepts and processes. Within the context of this research, the principles of constructive simulation were fully embraced to ensure its effective utilization. The teacher initiated the learning discourse by asking probing questions aimed at motivating individual learners and discerning their prior knowledge and experience upon entering the learning environment. Furthermore, questions were strategically crafted to establish connections between newly acquired knowledge and the learners' existing knowledge base. Following this, diverse instructional materials and methods, including audio aids, visual aids, audio visual aids, and community resources were employed to cater for various learning styles and preferences of learners.

Learners were actively engaged throughout the instructional process, fostering a democratic learning environment that encouraged free expression, collaboration and exchange of ideas. Additionally, the teacher demonstrated care for learners by acknowledging and accommodating individual learners' problems and learning styles. Learners were challenged with tasks while the teacher provided timely support and feedback to aid in learning. Questions were designed to prompt the application of acquired knowledge to real-life situations, drawing inspiration from the teachings of the Gospel of Luke. Finally, continuous monitoring and evaluation of the learning process allowed for the identification of areas needing improvement, with instructional practices being revised based on the received feedback. Constructive simulation involved reflective practice by the teacher and established a learner centred, practical, and interactive learning environment. This approach facilitated easier comprehension of the concepts within the topics of the Gospel of Luke, leading to improved learning outcome.

In contrast, the conventional method placed the teacher at the centre of the learning environment, relying on lectures and viewing the teacher as the primary source of knowledge (Dole et al., 2015; Mwanda et al., 2017). Conventional methods have been associated with a few shortcomings since they do not stimulate innovation and inquiry and learners' active participation is minimal because they have a perception that is fixed to their role as listeners in the discourse (Kassem, 2018; Situma, 2016). The current educational reforms however underscore student centred instructional practices and advocate for learner centred methods to support and boost active learner participation (Palak & Walls, 2009). Therefore, the increasingly negative effect of conventional methods on learning outcome necessitated constructive simulation, which is learner centred to be embraced in order to improve attainment of knowledge and skills by learners (Metto & Makewa, 2014). Continuous monitoring of CRE lessons was conducted through lesson observations to ensure efficient teachers' utilisation of the two teaching methods.

#### **2.4 Learning outcomes in Christian Religious Education**

The achievement of desirable outcomes is dependent on the technique of learning and instruction (Filho et al., 2018). Forman and College (2019) stated that effective teaching plays a vital role in bringing about tangible improvements in both the intellectual and social development of learners, thus providing definitive indications of successful learning outcomes. Optimum successful learning and, in turn, improve learning outcomes, CRE educators need to demonstrate expertise in their subject matter and proficiency in employing effective instructional techniques (Lavi et al., 2021). Moreover, a report by KICD in 2019 stated that current educational reforms highlight the importance of learner-centred instructional practices, advocating for approaches that prioritize the learner's active participation in the learning discourse. In light of the above, CRE teachers are expected to utilize teaching methods that accord learners an opportunity to take charge of their learning hence enhancing learning outcomes (Mueke et al., 2023).

In Kenya, teachers have been blamed for contributing to poor learning outcome due to the ineffective instructional methods that they apply in learning discourse (Adikinyi, 2017; Ndwiga & Odundo, 2020; Odundo & Gunga, 2013). This is because

teachers' beliefs, attitude and personal preferences influence the decisions they make and the teaching method they embrace in teaching (Palak & Walls, 2009). This has resulted in teaching being regarded as unattractive because teachers often fall back to teaching methods that minimize their workload at the expense of learners (Metto & Makewa, 2014).

Poor learning outcome has been linked by various researchers to ineffective methods of teaching used by the teachers in classroom discourse (Albalawi, 2018; Chebet, 2017; Ganyaupfu, 2013; Ndwiga & Odundo, 2020; Smimou & Dahl, 2012). The teacher is therefore expected to seek knowledge of how students think and conceive learning in order to tailor learning to their needs (Adu et al., 2014). Neveu (2009) further suggests that teachers ought to reflect on their teaching methods and adjust to those that enhance understanding by learners and consequently improve learning outcome. A change from the conventional methods of teaching to learner centred methods would certainly improve learners' conceptions on CRE as a subject (Mwanda et al., 2017; Odundo & Gunga, 2013).

## **2.5 Gender and Learning outcomes in Christian Religious Education**

Yuliskurniawati et al. (2019) defined gender as socially or culturally constructed characteristics and roles, which are ascribed to males and females in any society. Although there have been progressive efforts towards attaining gender parity, gender inequality persists in educational achievements among males and females at all levels in developing countries (Wals & Arjen EJ, 2012). Notably, Sub-Saharan Africa lags in achieving gender equality in education (Restivo et al., 2018). An acknowledged issue is the underperformance of female learners compared to their male counterparts, even when conditions are seemingly equivalent (Andayani et al., 2020).

The controversy over which gender attains better learning outcomes has been the subject of different studies (Akhigbe & Adeyemi, 2020; Asy'ari et al., 2019). Researchers have asserted that, in subjects related to science, male learners tend to outperform their female counterparts while in humanities, female learners often excel over male learners (Chang et al., 2019; Hsieh & Yu, 2023; Sagala et al., 2019). Nevertheless, some researchers have reported contradictory findings, indicating no

significant disparities in learning outcomes between males and females in liberal arts (humanities) and social sciences where CRE is situated (Yu, 2021). Furthermore, it is argued that when learner-centred teaching methods are utilized instead of teacher-centred approaches, female learners tend to exhibit superior learning outcomes compared to male learners (Adiansyah et al., 2023; Anggrawan et al., 2019).

The use of appropriate instructional methods can serve as a source of motivation during instruction (Dahlia Yuliskurniawati et al., 2019). Educators are expected to explore strategies for enhancing the learning outcomes of both male and female learners in the context of Luke's gospel (Siswati & Corebima, 2017). They are also urged to investigate modern techniques that can improve learning outcomes and attainment of educational objectives (Asy'ari et al., 2019). CRE instructors are challenged to adopt innovative teaching methods such as constructive simulation (Bakhsh et al., 2020).

## **2.6 Learners' Conceptions of Teaching Methods and its influence on Learning Outcome**

Adu et al. (2014) argue conception as the way people view an idea, object or others, which influences how the person thinks, feels and behaves towards that idea, object or person. Conception influences learners' attitude towards a particular subject because more often than not, they judge teachers based on appropriateness of teaching methods used to teach them (Adu et al. 2014). Teaching is a process that engages learners in a way that facilitates learning (Situma, 2016). The global framework of professional teaching standards has rolled out a framework that focuses on clarifying and specifying teaching standards that enhance quality education for all learners (UNESCO, 2019b).

To date, researchers have raised questions on the effect teaching methods have on student learning as well as the teaching methods that best result in better outcome (Ganyaupfu, 2013). The traditional conception holds teachers as the source and transmitter of knowledge as opposed to the current role of a guide of learners throughout the learning process (Koross, 2016). Teachers thus have a responsibility to scrutinize their deeply held teaching philosophies, particularly their conceptions of

different instructional methods (Yilmaz, 2008). Unsuccessful learners have little knowledge on suitable methods of approaching learning tasks and therefore, the conception they have towards a teaching method affects their comprehension either positively or negatively (Hasan, 2000). In consideration of the above, conceptions and more so learners', are an essential tool in assessing the teaching and learning (Aziz, 2012).

The extent to which a teaching method substantially produces significant improvement in learning outcomes largely depends on the instructor's operative implementation and the impact it has on the learner (Etuk, 2013). The question of suitability of teacher centred methods and learner centred methods of teaching in relation to learners' outcome has also emerged (Kassem, 2018). Dole et al. (2015) stated that unless a new pedagogy materializes, learners would get increasingly unenthusiastic to learn while teachers will be more hassled due to poor learning outcome. Learners who are effectively involved in the learning discourse take responsibility of their education which enables them acquire skills for lifetime use (Albalawi, 2018). This is through the use of instructional methods and materials which facilitate effective teaching in CRE (Iwuka & Henry, 2017).

Teachers need to be open to, and embrace instructional methods that will ensure not only better learning outcomes but also cater for learners' conceptions while building learners who are relevant in the ever changing world (Mwanda et al., 2017). These methods focus on learners' conceptions of their experience in the learning programme hence enabling teachers to create a suitable learning environment (Aziz, 2012). The teacher also caters for all learners via consideration of the background knowledge learners have in CRE (Zain, 2018). Based on the above, it is evident that there is a relationship between conception of learners towards the teaching method applied in instruction and learning outcome in CRE. In this regard, teachers ought to effectively apply appropriate teaching methods that enhance teaching as a way of boosting learning outcome (Mahmud, 2013).

## **2.7 Theoretical Framework**

Vygotsky's social cognitive theory (Vygotsky, 1978) and John Dewey's philosophy of reflective practice (Dewey, 1986) acted as the foundational theoretical framework, as seen in previous studies (Bakhsh et al., 2020; Okeke, 2015). These theories elucidate how the teaching methods utilized by educators affect the learning outcomes of learners. Vygotsky's social cognitive theory posits that intellectual development and cognitive skills are fostered through social relationships within a social-cognitive milieu (Eun, 2019). On the other hand, John Dewey's work emphasizes the integration of theory and practice, emphasizing the cyclic nature of learning experiences and the conscious application of these experiences (Watts, 2019).

Vygotsky's theory holds significant relevance in the realm of teaching and learning across various subjects including CRE. For this theory to be aptly utilised, the CRE instructor must delve into the cognitive development of their learners (Supena et al., 2021). Furthermore, Dewey asserts that an ideal curriculum should take into account the interests and abilities of learners to imbue it with meaning for them (Ye & Shih, 2021). To further expound on the significance of Vygotsky's social cognitive theory to this study, Anagün & Osmangazi (2018) elucidates that constructive simulation is rooted in the belief that learners actively construct knowledge through their internal cognitive processes. This entails presenting learners with diverse problem-solving activities to gauge the optimal starting point for instruction (Newman & Latifi, 2021). The teacher should embrace the principle of commencing with familiar concepts before introducing new ones, aligning their approach with the learners' prior experiences (Monteiro & Sibbald, 2020). Similarly, in education, Dewey's reflective practice centres on the construction and reconstruction of experiences, all of which enhance the ability to shape the direction of subsequent experiences (Schmidt & Allsup, 2019). Consequently, in a classroom utilizing constructive simulation, learners assume responsibility for their learning, and the teacher's role shifts towards facilitating skill acquisition and the generation of new knowledge (Monteiro & Sibbald, 2020).

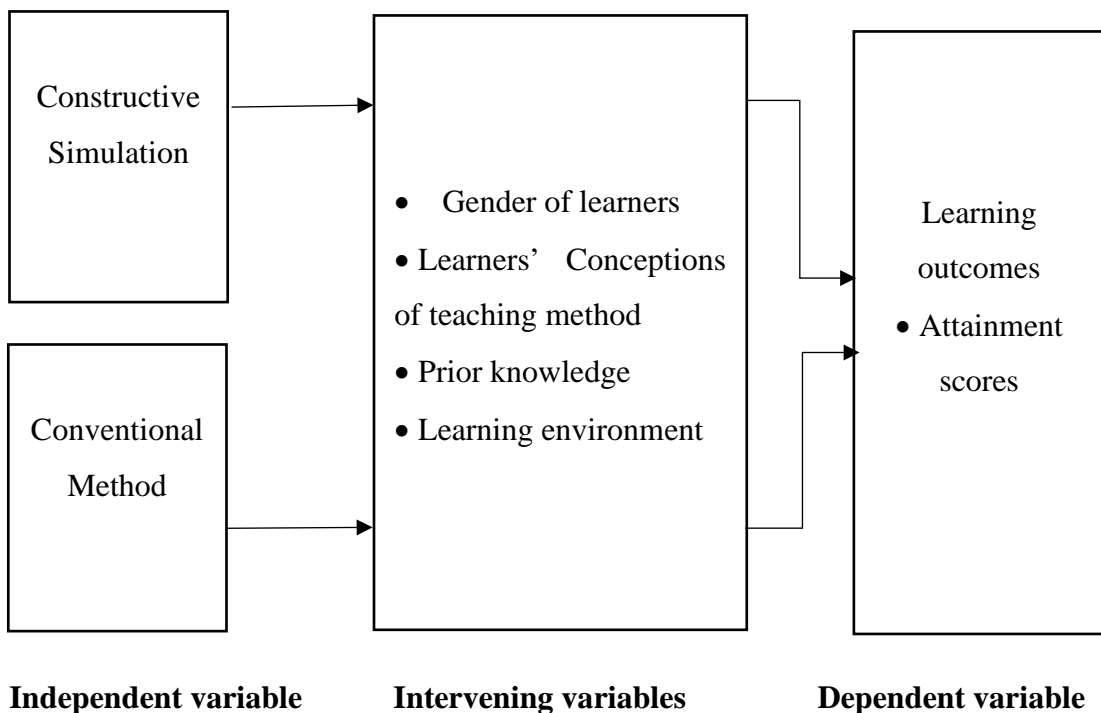
Recognizing the pivotal role of social interaction in cognitive development, the CRE teacher is encouraged to cultivate a learning environment that encourages peer-to-peer interactions among learners (Saudelli et al., 2021). Within the framework of constructive simulation, learners are encouraged to freely express themselves, engage in collaborative efforts with peers, and exchange ideas, all of which contribute to improved learning outcomes (Nyakito, 2018). The responsibility of the teacher is to assign tasks that are within the learners' grasp and proximity (Vasileva & Balyasnikova, 2019). To support this argument by Vygotsky, Dewey's theory indicates that tasks given to learners should ignite their desire for accomplishment and the pursuit of knowledge (Ndwiga & Odundo, 2020). As the learners enhance their competence and attain the Zone of Proximal Development (ZPD), the teacher incrementally reduces their guidance (Vygotsky, 1978).

Dewey's reflective practice philosophy holds significant implications not only for teaching in general but also for CRE in particular by challenging to educators, urging them to incorporate reflective practice skills into the teaching and learning process (Greenberger & Or, 2022). In line with a study by Odundo and Gunga (2013), habitually, classroom practices in CRE embrace the conventional methods where the teacher's role has been perceived as that of the primary source and conveyer of knowledge. However, Situma (2016) elucidated that although these methods may seem more straightforward in terms of teachers' preparation, they prove ineffective in promoting a deep understanding and long-term retention of the subject matter. Consequently, the CRE teacher is tasked with creating diverse opportunities that facilitate a practical and collaborative learning environment among the learners. Vygotsky and Dewey's theories complement each other in their arguments because when teachers continuously reflect on their teaching methods and classroom practices, they create an interactive learning environment. Consequently, interaction among learners and between the teacher and learners ensures learning is more practical than theoretical hence, learners understand CRE concepts better.

## **2.8 Conceptual Framework**

The conceptual framework illustrated in Figure 2.1 demonstrates the relationship between constructive simulation and learning outcome in CRE. The predictor

variable is constructive simulation while the outcome variable is the learning outcome in CRE where test scores are the indicators of outcomes. Within the context of this study, the effect of the independent variable on the dependent variable was determined by intervening variables including students' conceptions of teaching methods.



**Figure 2.1:** Conceptual Framework (Adopted and modified from Odundo 2005)

## 2.9 Summary of Empirical Literature and Research Gaps

In line with the literature reviewed, constructive simulation is a learner centred method that enhances learning outcome while the conventional method is teacher centred and promotes rote learning. In comparison to the conventional method, constructive simulation embraces active learner participation in learning. Additionally, gender differences influence learning outcomes. Learners' conceptions of the teaching methods their teachers use influences their learning outcome because they judge teachers based on the effectiveness of the teaching methods.

Several studies have supported the effectiveness of constructive simulation in enhancing learning outcome and facilitating effective learning (Bakhsh et al., 2020;

Charania et al., 2021; Hyslop-margison & Strobel, 2007; Irfan & Bakhsh; Okeke, 2015). The aforementioned researchers have advocated for the constructivist method such as constructive simulation as a means to promote interactive education across various subjects. However, there remains scarcity of research in the context of Christian Religious Education in Kenya, particularly concerning the Gospel of Luke. The focus is on the advantages of constructive simulation. Nevertheless, there is a notable gap regarding its adoption and pedagogical implementation in teaching of the Gospel of Luke, which is crucial in achieving CRE objectives, yet learning outcomes in this area are lacking. On the other hand, there are limited studies in Kenya regarding conceptions of teachers towards constructive simulation and conventional method. In addition, studies on how learners' conceptions influence learning outcomes in the Kenyan context and specifically in Embu West Sub-County are minimal. As a result, this study was conducted to address these research gaps suggested by (Ngussa & Makewa, 2018; Charania et al., 2021; Okeke, 2015).

## CHAPTER THREE

### RESEARCH METHODOLOGY

#### 3.1 Introduction

This section depicts procedures that pertained to the research. The chapter presents the research design, location of the study, target population, sample size and sampling technique, research instruments, validity, reliability, pilot study, data collection procedure, data analysis, logistical and ethical consideration.

#### 3.2 Research Design

The literature review led the study to adopt a mixed method approach, integrating both quantitative and qualitative techniques that bring forth greater confidence in the findings attained (Best & Kahn, 2006; Chu & Chang, 2017). In this research, it was not entirely possible to regulate all variables and experimental conditions rigorously. Therefore, the quantitative approach utilised was categorized as a quasi-experimental non-randomized control group study, using a pre-test and post-test design due to the use of intact classes (Ibe & Abamuche, 2019; Khayyer et al., 2021; Musengimana et al., 2022; Yang, 2022). This method was preferred for its ability to differentiate between intervention and control groups, allowing for conclusions to be drawn about them (Ciechanowski et al., 2019; Gale et al., 2019; Gopalan et al., 2020). Additionally, closed-ended questionnaires were utilized to gather data on the conceptions of teachers and students. The experimental design is illustrated in Table 3.1. The descriptive observations research design was also relevant to the study as it provides useful supportive data and serves as a foundation for further research with experimental and non-experimental designs (Kothari, 2001; Ololube & Kpolovie, 2012). Lesson observation schedules were used to gather qualitative data, which was quantitatively coded, enabling the analysis in a quantitative manner and facilitating deductions from the results.

**Table 3.1:** Diagrammatic representation of Research Design (Adopted from Olaitan & Nwoke 1988)

Pre-test	Treatment	Post-test
O <sub>1</sub>	X	O <sub>2</sub>
O <sub>1</sub>		O <sub>2</sub>

### 3.2.1 Interpretation of the Research Design

Within the context of this research, the interpretation of the diagrammatical representation of the design was as follows:

O<sub>1</sub> = Pre-test, O<sub>2</sub> = Post-test, X = Treatment Condition

Where:

O<sub>1</sub> = Pre-test of Learner Attainment Test in CRE

O<sub>2</sub> = Post-test of Learner Attainment Test in CRE

X = Treatment condition (Constructive simulation)

### 3.2.2 Control of confounding variables

This research involved several confounding variables that required careful control. Firstly, initial group differences were addressed. Due to the impracticability of randomization, intact classes were utilized to maintain normal school administration while controlling for this confound. Additionally, an independent samples test was computed to demonstrate the absence of significant differences between the two groups at baseline. Secondly, ensuring homogeneity of the instructional setting across all participant classes was crucial. To achieve this, participants were taught identical content from the CRE curriculum focusing on the Gospel of Luke, covering topics such as the Infancy and early life of Jesus, Jesus and John the Baptist, Galilean Ministry, and the Sermon on the Plain. These lessons were delivered within the regular periods allocated to the subject in the school timetable. Thirdly, addressing the non-equivalence of pre-test and post-test assessments was essential. As the post-test included more items than the pre-test, adjustments were made to introduce novelty in the test items. This modification aimed to accommodate the expected increase in knowledge and skills acquired by learners over the course of the study, thereby ensuring the validity of the assessment process.

### **3.3 Location of Study**

The study was conducted in Embu County, Kenya, which lies on the South- Eastern slopes of Mt. Kenya in about 120 kilometres North East of Nairobi along the Nairobi-Meru highway. Embu County comprises five sub-counties: Embu East, Embu North, Embu West, Mbeere North and Mbeere South. At the time of the research, Embu County had 195 public secondary schools, categorized into national, extra county, county and sub-county levels, which had 2, 23, 25, and 145 secondary schools respectively. However, the research had a specific focus on Embu West Sub-County. The choice of Embu West sub-county for the research was driven by the aim of ensuring maximum similarity in the participants' conditions and attributes.

(Source: County Director of Education Annual report 2021)

### **3.4 Target Population**

Target population refers to a specific group that is relevant to a particular study (Mugenda & Mugenda, 2003). The research targeted all the 6,650 form two learners in Sub-County secondary schools. Form two learners were selected for this research due to the declining number of learners selecting CRE as they progress to higher classes. In addition, sub-county schools were selected because they provided a coeducational learning environment, thereby minimizing potential gender bias. Embu West sub-county was selected for the research with the aim of ensuring maximum similarity in participants' conditions and attributes. Being situated in a peri-urban area, schools in Embu West sub-county experience similar school challenges and experiences including inadequate infrastructure, limited access to resources, diverse student population with varying socioeconomic backgrounds, diverse learning environments, and insufficient funding (Bidwell & Watine, 2014; Murimi et al., 2019).

### **3.5 Sample Size and Sampling Technique**

Sampling is the systematic method of choosing a subset of individuals from a larger group to represent the entire population in a study (Mugenda & Mugenda, 2003). Naisuma's Simplified formula was applied to determine the sample size for the participants as follows:

$$n = NC^2 / (C^2 + (N - 1)e^2)$$

Where  $n$  is the sample size,  $N$  is the total population (6650),  $C$  is the coefficient of variance (21%) and  $e$  is the standard error (0.02). Furthermore, the coefficient of variance range of  $21\% \leq C \leq 30\%$  and standard error of  $2\% \leq e \leq 5\%$  are acceptable for this formula. Consequently, the sample size for this study was 108 form two CRE learners (Table 3.2). Vitorino et al. (2020) stated that a sample size of 100 and above is considered adequate in experimental studies. In line with this, the sample size of 108 learners was sufficient for this study.

In the Embu West sub-county, sub-county secondary schools typically have an average of 45-55 form two learners per class (Embu County Government, 2018). Consequently, two sub-county schools within this sub-county were selected using voluntary sampling, ensuring adherence to the predetermined sample size. One of these schools constituted the treatment group, where learners were instructed using constructive simulation, while the other school comprised the control group, employing the conventional teaching method. In quasi-experimental studies, there is no randomization in assigning the participants to the treatment and control group (Gopalan et al., 2020; White, 2014). This study therefore applied self-selection by the CRE teachers from the two schools to decide the treatment and control groups to study learners' conceptions and the effect of the teaching methods on intact classes rather than randomly assigning participants to the experimental or control groups.

**Table 3.2:** Sample Size Matrix

Group	Teaching Method	Sampled learners
Treatment	Constructive Simulation	54
Control	Conventional Method	54
		108

### 3.6 Research Instruments

The study used various research instruments to collect both quantitative and qualitative data. The instruments include learner attainment tests in CRE, teacher questionnaires, student questionnaires and lesson observation Schedules.

### **3.6.1 Learner Attainment Tests in CRE**

The assessment tools used were validated Learner Attainment Tests in CRE. The instruments were selected because they effectively gauged the efficacy of the utilized teaching methods as described in (Khayyer et al., 2021; Musengimana et al., 2022; Winarsunu et al., 2023). The Learner Attainment Tests were developed based on four topics in the form two CRE curriculum centred on Luke's gospel, chosen from topics consistently yielding unsatisfactory learning outcomes as reported by the Kenya National Examination Council (KNEC). The topics include the infancy and early life of Jesus, John the Baptist and Jesus, The Galilean Ministry and The Sermon on the Plain. The Learner tests included a pre-test and post-test which encompassed a combination of open-ended, fill-in-the-gap, and application questions. The 18-item questions in the pre-test were crafted to evaluate the knowledge learners brought into the learning environment (Appendix II). The post-test, on the other hand, included 22-item questions that assessed the learners' ability to apply knowledge acquired in the classroom to real-life situations and societal values (Appendix III). Both the experimental and control groups responded to the item questions within a 50-minute timeframe for the pre-test and 1 hour for the post-test under similar examination conditions. The testing duration was determined by recording completion times from the first, middle and last participants during the pilot study in each school, and subsequently calculating the average time. This average became the testing time for the Learner Attainment Tests in the main study. The Learner Attainment Tests aimed at establishing the difference in the mean scores of the learners taught using constructive simulation and conventional method. The quantitative data obtained was critical in providing conclusions on the most suitable method of teaching and was reinforced by data collected via use of the other research instruments.

### **3.6.2 Student Questionnaire**

The student questionnaire provided elaborate data on students' conceptions towards the methods used by their teachers within the context of this study. The student questionnaires included 7-item questions for treatment group and control groups. The student questionnaire comprised section A and B (Appendix VI and VII). Section A included students' background information comprising gender and age. Section B, on

the other hand, entailed a 5-point Likert scale where 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree and 5 = Strongly Agree. This scale assessed students' perspectives regarding constructive simulation and conventional methods. The mean scores were calculated and interpreted to reflect the learners' conceptions on various questionnaire items. Specifically, a mean of 1.0–2.4 signified negative conceptions, a mean of 2.5–3.4 signified neutral conceptions while a mean of 3.5–5.0 signified positive conceptions. Learners' conceptions are a vital tool in assessing teaching and learning hence, they are critical interpreters of the impact of teaching methods on learning outcome (Aziz et al., 2012). The student questionnaires were distributed after the intervention was completed.

### **3.6.3 Lesson Observation Schedule**

A pre-prepared document that outlines the behaviours and situational elements to be observed and recorded during data collection is what constitutes an observation schedule (Denzin et al., 2023; Frey, 2018). In this study, the LOS aided in evaluation of the application of constructive simulation and conventional methods in instruction. The lesson observation schedule was to obtain information decisively on the instructional conduct of CRE teachers. The lesson observation schedule (Appendix VIII) observed teacher preparedness of the lesson through the following documents: availability of the lesson plan (Available or Not available), adequacy of objectives (Adequate or Inadequate) and availability of lesson notes (Available or Not available). Furthermore, the lesson development, lesson presentation, learner participation, learning resources, evaluation of learning resources and lesson evaluation were scored on a scale of 1-5 as follows: 1 = Below Average, 2 = Average, 3 = Satisfactory, 4 = Good and 5 = Very Good. In total, 30 CRE lessons were observed, that is, 15 lessons in treatment and 15 lessons in control.

### **3.7 Validity of the Research Instruments**

A data collection instrument is considered valid if the chosen and included content is relevant to the research gap identified (Kothari, 2004). Content validity was applied to check the characterization of the item questions in the research instruments while face validity of observation of the rating scale was determined to ensure the soundness of the instrument in collecting data in line with the study objectives.

Within the context of this study, the validation of the research instruments was determined through a comprehensive examination by the researcher's supervisors and experts in the research field. Furthermore, piloting was carried out whose aim was to scrutinize the concepts within the learner attainment tests, questionnaires and lesson observation schedules. This ensured identification and modification of any complexities that may have existed before utilization of the research instruments.

### 3.8 Reliability of the Research Instruments

The extent to which an instrument produces consistent results of a study under similar methodology is referred to as reliability (Mwanje, 2001). In social sciences, the acceptable reliability coefficient value is between 0.7 and 1.0 (Best & Kahn, 2006; Wells & Wollack, 2003). The learner attainment tests were administered twice, the first test and retest to the same participants after a five-week intervention duration. Reliability was tested using the Kuder Richardson formula (k – R21) to establish internal consistency because the tests included pass and fail questions. The Kuder Richardson formula is described below.

$$KR - 21 = \left(\frac{n}{n-1}\right) \left(1 - \left(\frac{M(n-M)}{N(\text{Variance})}\right)\right)$$

Where: n = sample size, Variance = variance for the test, M = mean score for the test  
 A reliability index of 0.85 for pre-test and 0.81 for the post-test in treatment group was recorded while a reliability index of 0.76 for pre-test and 0.78 for the post-test were recorded in the control group. These reliability indexes were high enough for the learner attainment tests to be considered reliable because they were above the 0.7 threshold (Okeke, 2015). Moreover, the Pearson Product Moment Correlation Coefficient formula to establish the stability was calculated because the test involved a test-retest as follows:

$$r = \frac{\sum(zx)(zy)}{N}$$

Where: r = correlation coefficient, zx = standard score of the values for variable X, zy = standard score of the values for variable Y, and N = number of pairs of values for X and Y.

Reliability coefficients of 0.51 for treatment group and 0.67 for control group were established. Hidajat (2023) and Tong et al. (2021) posit that a strong correlation between the pre-test and post-test scores indicates that the instruments are reliable.

Additionally, the reliability of the questionnaire items was evaluated via the Cronbach's alpha coefficient ( $\alpha$ ). In accordance with George and Mallery (2019) the coefficient is suitable because it gives finer estimates when testing reliability of a Likert scale as was the case in this study. The formula for Cronbach's alpha is given by:

$$\alpha = K \cdot c / [v + (K - 1) c]$$

Where: K represents the number of items in the assessment instrument.

c denotes the average inter-item covariance among the items.

v indicates the overall mean-variance.

The student questionnaire was reliable at 0.802 and 0.772 for treatment and control groups respectively. Additionally, the lesson observation schedules had a reliability of 0.821 and 0.792 for treatment and control correspondingly. Taber (2018) elucidated that in social science research, the tenable reliability coefficient for Cronbach alpha ( $\alpha$ ) is 0.7. In conclusion, the reliability of all the research instruments was ascertained and therefore sufficient in collecting the anticipated data.

### **3.9 Pilot Study**

The pilot study ascertained whether there existed obscurity in any items, if the instruments evoked the anticipated data and if the objectives were suitably addressed in order to refine validity and reliability. The research instruments were trial tested over a duration of two weeks on a sample of 40 form two CRE learners in Embu East Sub-County, who were not part of the actual research. Johanson and Brooks (2010) stated that 30 to 40 participants were sufficient for pilot studies comparing groups. The pilot study was conducted to validate the research instruments' suitability for gathering data aligned with the research objective. Embu East was selected for piloting since its population had similar characteristics to those of the study population in Embu West. Upon completion of the pilot study, noted insufficiencies with regard to the reliability and validity of the instruments was catered for before the main study. As a result, the questionnaire items were rephrased to match the respondents' education levels and to remove any ambiguities.

### **3.10 Data Collection Procedures**

The researcher obtained a research approval from the Board of Post- Graduate Studies (BPS), University of Embu that facilitated obtaining of a research license from the National Commission for Science, Technology and Innovation (NACOSTI) prior to data collection. Further clearance from the Ministry of education, specifically the State Department of Early and Basic Learning, Embu County, and the principals of the schools participating in the research, was sought. Once clearance was granted, the researcher visited the schools participating in the study to make selection of the treatment and control groups. Befitting time was allocated to meet and share with the teachers on what the research was about as well as its importance. To this end, a three-day training for the CRE teacher in the treatment group and a one-day seminar for the CRE teacher in the control group were carried out to engage teachers on teaching using the allocated methods. .

A pre-test was administered to form two students in both treatment and control groups before the commencement of the study. Once this was done, an intervention (constructive simulation) was applied to the treatment group while the other was the control group taught using the conventional method of teaching over a five weeks duration. The researcher observed the two groups throughout the period of the study in order to ensure that the teaching methods were suitably utilised in teaching. Kothari (2004) argues that, in order to curb the problem of respondents discussing the correct answer to write among themselves, self- administration of the instruments is encouraged. Therefore, upon the completion of the discourse, the researcher directly administered the teacher and student questionnaires. This implied that this data was first hand. A post-test was administered in both treatment and control groups upon completion of the intervention and administering of questionnaires. The pre and post-tests were marked using a standardized criterion in order to ensure uniformity and no bias in marking.

### **3.11 Data Analysis**

Organization of data obtained from the research instruments should be done in significant patterns so as to bring out the nature of the data (Best & Kahn, 2006). Data were analysed using the Statistical Package for Social Sciences (SPSS) version 25.

Data cleaning and coding were conducted prior to statistical analysis. Descriptive statistical analysis, encompassing the calculation of frequencies, and percentages, the generation of graphs, and the computation of standard deviation and means were used to present data. Test scores from the learner attainment test were presented in means and standard deviations. Responses from the teacher questionnaires were rated using Likert scale of 1 – 5. An overall item mean of 1.0–1.4 indicated strongly disagree, 1.5–2.4 indicated disagree, 2.5–3.4 indicated undecided, 3.5–4.4 indicated agree while 4.5–5.0 indicated strongly agree. Responses from the student questionnaires were assessed by means of a Likert scale from strongly agree (5) to strongly disagree (1). The item questions' mean value of 1.0–2.4 signified negative conceptions, a mean of 2.5–3.4 signified neutral conceptions while a mean of 3.5–5.0 signified positive conceptions. To establish the utilization of constructive simulation and conventional methods in teaching, data from the lesson observation schedule were presented using frequencies. To ascertain the effectiveness of constructive simulation and conventional methods of teaching, a *t*-test analysis was utilised. To establish the similarity scores between the pre-test and post-tests correlation analysis was utilised. Furthermore, a Pearson moment correlation coefficient and regression analysis were calculated to establish the relationship between conceptions and learning outcome. The analysis matrix is presented in Table 3.3.

### **3.12 Logistical and Ethical Consideration**

The research went through an ethical evaluation and obtained approval from the University of Embu's Board of Postgraduate Studies (BPS). This approval was subsequently utilised in attaining a research license from the National Council for Science and Technology (NACOSTI) with identification number NACOSTI/P/23/24037. Furthermore, a formal approval letter was secured from the County Director of Education and Ministry of Education offices, specifically the State Department of Early Learning and Basic Education in Embu County, under the reference EBC/GA/32/1/Vol. V/97. Participation in the research was voluntary, and it was contingent upon the completion of a consent form signed by the CRE teachers responsible for the CRE learners. Respondents were explicitly reassured that the

information provided was for research purposes only and would be handled with utmost confidentiality during data analysis and reporting.

**Table 3.3:** Analysis Matrix

Objective	Hypotheses	Variables	Standardized tools
Difference in mean scores of learners taught using constructive simulation and conventional method	There are no statistically significant differences in the mean scores of learners taught using constructive simulation and conventional method	Teaching methods	Mean difference Correlation <i>t</i> -test
Difference in the mean scores of male and female learners taught using constructive simulation and conventional method.	There are no statistically significant differences in the mean scores of learners taught using constructive simulation and conventional method	Teaching methods Gender	Mean difference Correlation <i>t</i> -test
Relationship between learners' conceptions of the method employed in teaching and their outcome in Christian Religious Education	There is no statistically significant relationship between learners' conceptions of method employed in teaching and their learning outcome in Christian Religious Education	Learners' conception Learning outcome	Correlation Linear Regression

## CHAPTER FOUR

### RESEARCH RESULTS AND DISCUSSIONS

#### 4.1 Introduction

This chapter presents the findings and discussions centred on the research objectives. The first objective was to establish the difference in the mean scores of learners taught using constructive simulation and conventional method. The second objective was to assess the difference in the mean scores of male and female learners taught using constructive simulation and conventional method. The third objective was to analyse the relationship between learners' conceptions of the method employed in teaching and their outcome in Christian Religious Education. In addition, the chapter encompasses the analysis of the research findings and discussion of the results.

#### 4.2 Response Rate

The study employed a quasi-experimental design, necessitating that the researcher personally visited the consenting participants and remained in the schools for the duration of the study. The respondents comprised 108 form two CRE learners in both treatment and control groups. However, the study encountered an average response rate of 83%, resulting in 90 CRE learners as shown in Table 4.1. The attrition differed across the treatment (93%) and control (74%) groups, which was attributed to discrepancy in school absenteeism emanating from lack of school fees, high inconsistency in class attendance and learner dropout rates in the two schools. In addition, 30 lessons (15 per group) were observed resulting in a 100% response rate. According to Mugenda and Mugenda (2003), a response rate exceeding 50% is adequate for analysis. All the response rates in this study were above the recommended threshold hence were sufficient for analysis.

**Table 4.1:** Sample Size against Response Rate

Group	Sample size	Response rate	Percentages
Treatment	54	50	93
Control	54	40	74
Total	108	90	83

### 4.3 Descriptive Data of Respondents

This section establishes the demographic statistics of the teachers and learners who participated in the research.

#### 4.3.1 Demographic Attributes of Form Two CRE learners

The study gathered data concerning the descriptive characteristics of CRE learners in treatment and control groups (Table 4.2).

**Table 4.2:** Attributes of CRE learners

Group	Variable	Description	Frequency	Percentage	
Treatment	Gender	Male	30	60	
		Female	20	40	
		Total	50	100	
	Age	Below 14 years	2	4	
		14 – 15 years	11	22	
		16 – 17 years	31	62	
		Above 17 years	6	12	
		Total	50	100	
	Control	Gender	Male	25	62
			Female	15	38
Total			40	100	
Age		Below 14 years	1	3	
		14 – 15 years	9	22	
		16 – 17 years	25	62	
		Above 17 years	5	13	
Total		40	100		

Based on the findings in Table 4.2, 30 learners (60%) in the treatment group were male while the remaining 20 learners (40%) were female. In the control group, 25 learners (62%) were male while 15 learners (38%) were female. School enrolment in both groups was higher for male learners than that of their female counterparts. With reference to this study, the results were explained by high levels of dropout rates of girls, which affect school enrolment. In recent studies, girls have registered lower

enrolment rates and greater dropout rates than boys, suggesting a higher risk of opting out for the few girls who are enrolled in school (Vitorino et al., 2020). The aforementioned corroborates the study results. These findings, however, contradict a UNESCO report, which determined that male learners' school enrolment declines as they progress to higher levels of learning in comparison to female learners (UNESCO, 2019b). Additionally, study results are inconsistent with studies by Gitiha et al. (2024); Saoke et al. (2022) who indicated that CRE is predominantly studied by females.

Results on age (Table 4.2) demonstrate that in the treatment group, majority of the learners (62%) were between the age of 16 and 17 years while the minority of the learners (4%) were below the age of 14 years. Similarly, in the control group, majority of the learners (62%) were between the age of 16 and 17 years while the minority of the learners (3%) were below 14 years. According to the ministerial policy in Kenya, the appropriate age for form two learners should be 15 - 16 years (Ministry of Education, 2018). The study results were inconsistent with this ministerial guide, which was attributed to increased repetition rates by learners. Elfert (2019); UNESCO (2019a) elucidated that peri-urban schools, where the two groups were situated, have high repetition rates of learners. Learners below the age of 14 years were explained by the 100% transition directive implemented regardless of age to ensure all learners in Kenya progress to the next level of education and acquire basic education (Education, 2021; House & Taifa, 2020; The Ministry of Planning and Devolution, 2007).

#### **4.3.2 Similarity of the CRE learners at baseline**

The study therefore sought to establish whether there were significant differences between learners in the two groups at baseline. To ascertain this, an independent samples t-test was computed based on pre-test scores.

**Table 4.3:** Similarity of Participants in Treatment (CS) and Control (CM) groups at Baseline

Pre-test	t	df	Sig.(2-tailed)	Mean Difference	95% C.I of the Difference	
					Lower	Upper
Male vs Female CS	1.321	48	.193	5.783	-3.017	14.583
Male vs Female CM	1.922	38	.062	10.427	-.557	21.411

With reference to Table 4.3, there were no significant differences ( $t_{(48)} = 1.321, p = 0.193$ ) in pre-test scores for male learners ( $M = 28.43, SD = 13.866$ ) and female learners ( $M = 22.65, SD = 16.950$ ) in the treatment. The magnitude of the differences in means (Mean Difference = 5.783, 95% CI: - 3.017 to 14.583) was very minimal. Similarly, in the control group, study results (Table 4.3) revealed that there were no significant differences ( $t_{(38)} = 1.922, p = 0.062$ ) in pretest scores for male learners ( $M = 32.56, SD = 15.677$ ) and female learners ( $M = 22.13, SD = 18.106$ ). This showed that the magnitude of the differences in means (Mean Differences = 10.427, 95% CI: - 0.557 to 21.411) was very small. In light of the aforementioned results, there were no differences between male and female learners in the two groups. The implication was that treatment and control groups were similar at baseline and therefore suitable for the study. The selected schools were situated in a peri-urban area, therefore, they experienced similar school challenges and experiences including inadequate infrastructure, limited access to resources, diverse student population with varying socioeconomic backgrounds, diverse learning environments, and insufficient funding (Bidwell & Watine, 2014; Murimi et al., 2019; Nyeko et al., 2015).

### 4.3.3 Utilization of Constructive Simulation and Conventional Method

Lesson observation schedules with a scale of 1-5, where 1 indicated Below Average and 5 indicated Very Good, were used to observe all the 15 lessons taught over the duration of the study, in order to establish the application of constructive simulation and conventional methods in teaching CRE lessons. Table 4.4 presents the results from the lesson observation.

**Table 4.4: Application of teaching methods in Treatment and Control groups**

Treatment		<b>VG</b>	<b>G</b>	<b>S</b>	<b>A</b>	<b>BA</b>
	<b>Lesson Development</b>					
	Introduction	46.7%	26.7%	20%	6.7%	0%
	Content organization	46.7%	53.3%	0%	0%	0%
	Conclusion/Summary	46.7%	26.7%	26.7%	0%	0%
	<i>Average</i>	<b>46.7</b>	<b>35.6</b>	<b>15.6</b>	<b>2.2</b>	<b>0</b>
	<b>Lesson Presentation</b>	<b>VG</b>	<b>G</b>	<b>S</b>	<b>A</b>	<b>BA</b>
	Mastery of content	66.7%	33.3%	0%	0%	0%
	Lesson coverage in line with syllabus	86.7%	13.3%	0%	0%	0%
	Accuracy of content	60%	40%	0%	0%	0%
	Adherence to teaching method	66.7%	26.7%	6.7%	0%	0%
	<i>Average</i>	<b>70.0</b>	<b>28.3</b>	<b>1.7</b>	<b>0</b>	<b>0</b>
	<b>Lesson Participation</b>	<b>VG</b>	<b>G</b>	<b>S</b>	<b>A</b>	<b>BA</b>
	Method brings forth active learner participation	73.3%	20%	6.7%	0%	0%
	Ability to do given tasks	26.7%	46.7%	13.3%	13.3%	0%
	Ability to make short notes	0%	33.3%	40%	26.7%	0%
	<i>Average</i>	<b>33.3</b>	<b>33.3</b>	<b>20</b>	<b>13.3</b>	<b>0</b>

<b>Learning Resources</b>		<b>VG</b>	<b>G</b>	<b>S</b>	<b>A</b>	<b>BA</b>
Visual		20%	20%	6.7%	0%	53.3%
Audio		60%	40%	0%	0%	0%
Audio-visual		0%	0%	20%	40%	40%
Community Resources		26.7%	73.3%	0%	0%	0%
<i>Average</i>		<b>26.7</b>	<b>33.3</b>	<b>6.7</b>	<b>10</b>	<b>23.3</b>
<b>Evaluation of learning resources</b>		<b>VG</b>	<b>G</b>	<b>S</b>	<b>A</b>	<b>BA</b>
Adequacy		26.7%	60%	13.3%	0%	0%
Relevance		66.7%	33.3%	0%	0%	0%
<i>Average</i>		<b>46.7</b>	<b>46.7</b>	<b>6.7</b>	<b>0</b>	<b>0</b>
<b>Lesson Evaluation</b>		<b>VG</b>	<b>G</b>	<b>S</b>	<b>A</b>	<b>BA</b>
Monitoring learner understanding		33.3%	66.7%	0%	0%	0%
Catering for all types of learners		20%	33.3%	46.7%	0%	0%
Guiding on doing given tasks		20%	60%	13.3%	6.7%	0%
Relevance of the given assignment		80%	20%	0%	0%	0%
<i>Average</i>		<b>38.3</b>	<b>45</b>	<b>15</b>	<b>1.7</b>	<b>0</b>
Control	<b>Lesson Development</b>	<b>VG</b>	<b>G</b>	<b>S</b>	<b>A</b>	<b>BA</b>

Introduction	13.3%	53.3%	26.7%	6.7%	0%
Content organization	20%	53.3%	20%	6.7%	0%
Conclusion/Summary	6.7%	26.7%	46.7%	13.3%	6.7%
<i>Average</i>	<b>13.3</b>	<b>44.4</b>	<b>31.1</b>	<b>8.9</b>	<b>2.2</b>
<b>Lesson Presentation</b>	<b>VG</b>	<b>G</b>	<b>S</b>	<b>A</b>	<b>BA</b>
Mastery of content	46.7%	53.3%	0%	0%	0%
Lesson coverage in line with syllabus	53.3%	46.7%	0%	0%	0%
Accuracy of content	33.3%	66.7%	0%	0%	0%
Adherence to teaching method	33.3%	53.3%	13.3%	0%	0%
<i>Average</i>	<b>41.7</b>	<b>55</b>	<b>3.3</b>	<b>0</b>	<b>0</b>
<b>Lesson Participation</b>	<b>VG</b>	<b>G</b>	<b>S</b>	<b>A</b>	<b>BA</b>
Method brings forth active learner participation	0%	6.7%	26.7%	60%	6.7%
Ability to do given tasks	0%	13.3%	20%	53.3%	13.3%
Ability to make short notes	0%	0%	0%	26.7%	73.3%
<i>Average</i>	<b>0</b>	<b>6.7</b>	<b>15.6</b>	<b>46.7</b>	<b>31.1</b>
<b>Learning Resources</b>	<b>VG</b>	<b>G</b>	<b>S</b>	<b>A</b>	<b>BA</b>
Visual	0%	0%	0%	0%	100%

Audio	0%	0%	0%	0%	100%
Audio-visual	0%	0%	20%	40%	40%
Community Resources	0%	13.3%	13.3%	20%	53.3%
<b><i>Average</i></b>	<b><i>0</i></b>	<b><i>3.3</i></b>	<b><i>8.3</i></b>	<b><i>15</i></b>	<b><i>73.3</i></b>
<b>Evaluation of learning resources</b>	<b>VG</b>	<b>G</b>	<b>S</b>	<b>A</b>	<b>BA</b>
Adequacy	0%	0%	6.7%	53.3%	40%
Relevance	6.7%	60%	6.7%	0%	26.7%
<b><i>Average</i></b>	<b><i>3.4</i></b>	<b><i>30</i></b>	<b><i>6.7</i></b>	<b><i>26.7</i></b>	<b><i>33.4</i></b>
<b>Lesson Evaluation</b>	<b>VG</b>	<b>G</b>	<b>S</b>	<b>A</b>	<b>BA</b>
Monitoring learner understanding	0%	13.3%	53.3%	33.3%	0%
Catering for all types of learners	0%	0%	80%	20%	0%
Guiding on doing given tasks	0%	6.7%	13.3%	66.7%	13.3%
Relevance of the given assignment	26.7%	46.7%	6.7%	20%	0%
<b><i>Average</i></b>	<b><i>6.7</i></b>	<b><i>16.7</i></b>	<b><i>38.3</i></b>	<b><i>35</i></b>	<b><i>3.3</i></b>

VG: Very Good; G: Good; S: Satisfactory; A: Average; BA: Below Average

Table 4.4 presents various stages of learning using constructive simulation and conventional method. During lesson development, 46.7% of the introduction was very good, 53.3% of content organization was good while 46.7% of the summary was very good in treatment group. In the control group, 53.3% of introduction was good, 53.3% of content organization was good while 46.7% of the summary was satisfactorily done. On average, in treatment group, the lesson development was very good while in the control group it was good. The learner is considered a unique individual with prior knowledge, unique needs and experiences (Kim, 2005). Therefore, the lesson development stage becomes very critical in setting the pace for subsequent content to be covered. The teacher is expected to initiate learning by asking probing questions aimed at motivating individual learners and discerning their prior knowledge and experience upon entering the learning environment (Mwanda et al., 2017). This enables the learner establish connections between newly acquired knowledge and the learners' existing knowledge base.

Results of lesson presentation (Table 4.4) in the treatment group showed that the teacher demonstrated very good mastery of content in 66.7% of the lessons. 86.7% of the lessons (very good) were in line with the syllabus. Accuracy of the content was very good at 60%. Furthermore, the teacher's adherence to the teaching method in 66.7% of the lessons was very good. On average, lesson presentation was very well done. In the control group, the teacher demonstrated good mastery of content in 53.3% of the lessons. 53.3% of the lessons (very good) were in line with the syllabus. Accuracy of the content was good at 66.7%. Moreover, the teacher's adherence to the teaching method in 53.3% of the lessons was good. On average, lesson presentation was well done. Dami et al. (2023) revealed that a teacher's competence is assessed based on their grasp of subject matter, pedagogical knowledge, skills, conduct and commitment towards learners. The results of this study indicate that the teachers in both schools demonstrated competence by having good mastery of content and ensuring the lessons were in line with the syllabus. In particular, certified and knowledgeable CRE teachers are expected, as part of their core responsibilities, to possess sufficient knowledge of the subject content and the ability to create suitable teaching and learning experiences (Itolondo, 2012; Mayende, 2022; Situma, 2016).

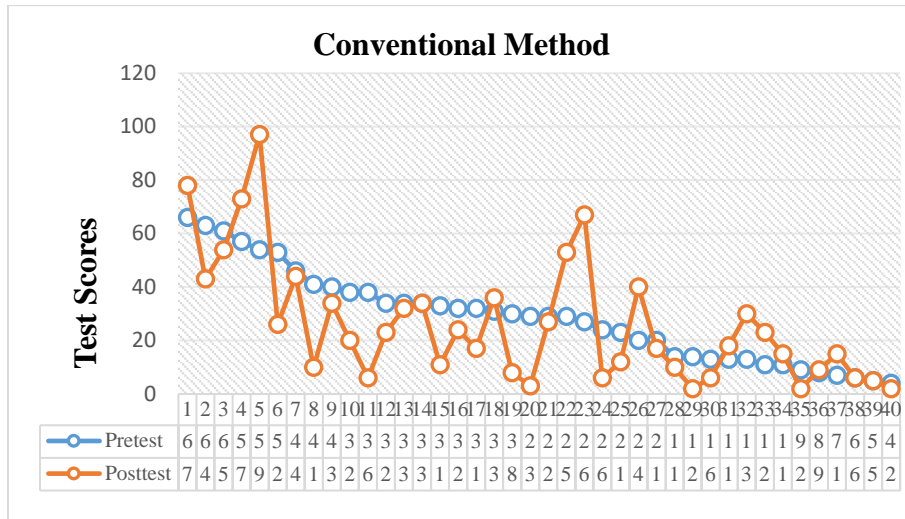
Findings on lesson participation (Table 4.4) in treatment group indicated that in 73.3% of the lessons (very good), constructive simulation brought forth active learner participation. In 46.7% of the lessons, learners demonstrated good ability to do given tasks. Additionally, in 40% of the lessons, learners satisfactorily demonstrated the ability to make short notes during learning. Therefore, on average, constructive simulation significantly enhanced lesson participation. In control, on the other hand, the conventional method averagely brought forth active learner participation in 60% of the lessons. Learners demonstrated an average ability to do given tasks in 53.3% of the lessons. Moreover, learners demonstrated a below average ability to make short notes during learning. This implied that the conventional method of teaching averagely enhanced lesson participation. From the findings of this study, it is evident that constructive simulation resulted in active learner participation while the conventional method failed to do so in majority of the lessons. Conventional methods have been associated with a few shortcomings since they do not stimulate innovation and inquiry and learners' active participation is minimal because they have a perception that is fixed to their role as listeners in the discourse (Kassem, 2018 & Situma, 2016). The results corroborate a study that revealed that, in a constructive simulation classroom, the role of the teacher is to facilitate and create a democratic and inclusive environment while allowing learners own the learning discourse and guiding them to acquire skills hence produce new knowledge (Bolton, 2010).

With reference to Table 4.4, in treatment group, utilization of visual aids was below average at 53.3%, utilization of audio resources was very good at 60%, and the utilization of audio-visual aids was average at 40% while utilization of community resources was good at 73.3%. The average utilization of learning resources using constructive simulation was good. In control group, utilization of visual aids and audio resources was below average in all lessons. Utilization of audio-visual aids was average at 40% while utilization of community resources was below average at 53.3%. Consequently, the average utilization of learning resources using the conventional method was below average. Constructive simulation adequately incorporated the utilization of learning resources, which enhanced learning and practicability of CRE content. On the other hand, the conventional method did not

give room for utilization of learning resources in majority of the lessons. An evaluation of learning resources as utilized in treatment group revealed that for majority of the lessons, the adequacy (60%) and relevance (66.7%) of learning resources was good and very good respectively. This implied that the teacher used sufficient resources that enhanced learning. In addition, the learning resources were pertinent to the objectives. An evaluation of learning resources in control group indicated that the adequacy of learning resources was average (53.3%) while the relevance was good (60%). The implication was that the teacher failed to use sufficient learning resources. However, the learning resources that were used were appropriate and enhanced understanding of the content. CRE is a subject in the Form two curriculum tasked with guiding learners in understanding values from a religious standpoint, aiding in acquisition of social and moral insights necessary for making sound moral choices in life (KICD, 2019). Effective learning of these essential values and skills requires a shift from theoretical teaching approaches to practical methods that directly instil the desired values and skills in learners through utilization of adequate and relevant learning resources (Odundo & Gunga, 2013).

Findings (Table 4.4) indicate that in treatment group, the teacher monitored learners' understanding in 66.7% of the lessons. Constructive simulation was satisfactorily effective in catering for all types of learners (46.7%). Guidance of learners in doing given tasks was good in 60% of the lessons. Relevance of the given assignment was very good in 80% of the lessons. In contrary, the teacher in control group satisfactorily monitored learners' understanding. The conventional method of teaching satisfactorily catered for all types of learners during 80% of the lessons. The teacher's guidance on doing given tasks was average. In 46.7% of the lessons, the assignment given by the teacher was relevant to the content taught. Consistent monitoring of the learner's understanding is crucial to a teacher as this is the basis for establishing a guide on how to create a diverse and inclusive learning environment for learners. In recent years, there has been a significant shift in the role of the teacher towards that of a facilitator, guiding learners throughout their educational journey (Koross, 2016). The diminishing effectiveness of conventional methods in terms of learning outcomes has spurred a growing need for the adoption of learner-centred





**Figure 4.2:** A graphical representation of test results arranged in descending order, according to pre-test scores of learners in the Control Group.

Consistent with Figure 4.1, in the pre-test, two learners (4%) attained above-average scores (50% and above) while 48 learners (96%) registered below-average scores (50% and below). In the post-test, however, 18 learners (36%) had above-average scores while 32 learners (64%) recorded below-average scores. When constructive simulation was utilised, 47 learners (94%) improved on their scores while the remaining three learners (6%) dropped. Figure 4.2 exemplifies comparison of individual learners’ test scores attained by the control group. In the pre-test, six learners (15%) had above-average scores while 34 learners (85%) recorded below-average scores. Likewise, in the post-test, six learners (15%) had above-average scores while 34 learners (85%) registered below-average scores. The results demonstrate that 12 learners (30%) improved their scores; three learners (8%) maintained their scores while the remaining 25 learners (62%) registered a drop in their scores when the conventional method of teaching was employed. Unlike constructive simulation, the conventional method of teaching was ineffective in enhancing learning outcomes for majority of the learners. Constructive simulation is a learner centred method while the conventional method is teacher centred. Vitorino et al. (2020) argue that new pedagogical frameworks such as the constructivist method should be embraced in order to ensure learners are active participants in their learning, which in turn improves their learning outcomes. This is because

conventional methods of teaching hinder the learners' ability to actively construct knowledge hence leading to poor learning outcomes (Saoke et al., 2023).

#### 4.4.2 Pearson Correlation Analysis

Pearson's Moment Correlation Coefficient was computed to calculate the similarity scores between the pre-test and post-test assessments.

**Table 4.5:** Pearson's correlation between pre-test and post-test scores in Treatment and Control groups

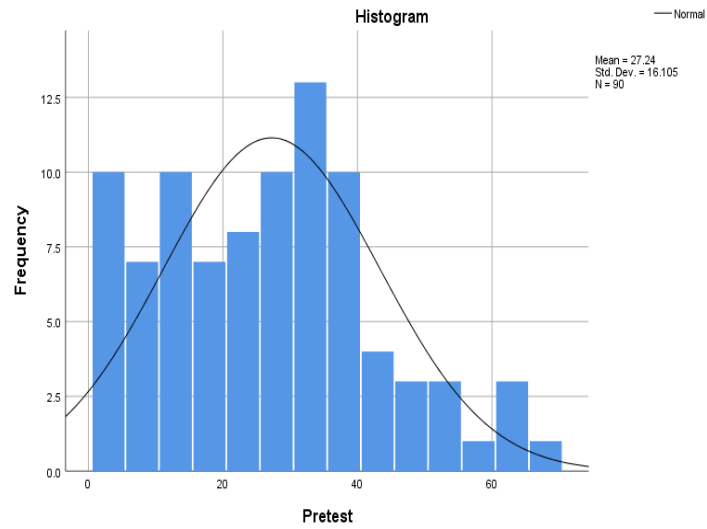
Group		Post-test	
Constructive simulation	Pre-test	Pearson Correlation	.510**
		Sig. (2-tailed)	.000
		N	50
Conventional method	Pre-test	Pearson Correlation	.673**
		Sig. (2-tailed)	.000
		N	40

\*\* . Correlation is significant at the 0.01 level (2-tailed).

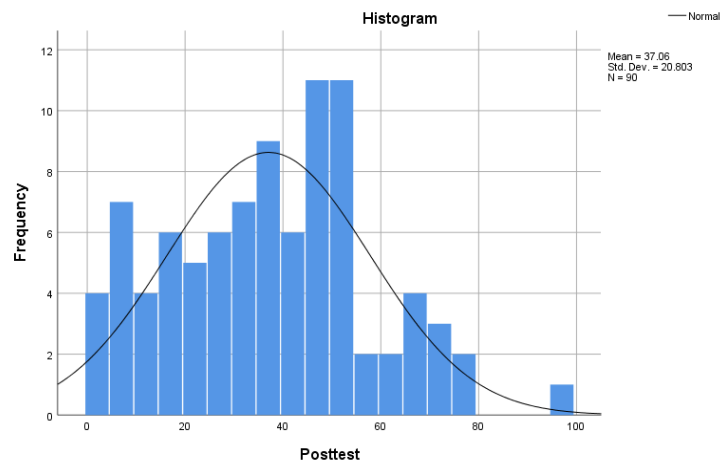
Results in Table 4.5 reflect a strong positive link between pre-test and post-test scores of CRE learners taught using constructive simulation ( $r = 0.510, p < 0.01$ ) and CRE learners taught using the conventional method ( $r = 0.673, p < 0.01$ ). The positive and significant relationship implies that in both the treatment and control groups, the two tests before and after were positively correlated (Hidajat, 2023; Musengimana et al., 2022).

#### 4.4.3 Normality tests

The numerical and graphical methods were employed to ensure the statistical assumption of normality was not violated prior to conducting a t-test analysis.



**Figure 4.3:** Histogram for pre-test scores



**Figure 4.4:** Histogram for post-test scores in Christian Religious Education.

**Table 4.6:** Shapiro-Wilk's test of Normality

	Shapiro-Wilk		
	Statistic	df	Sig.
Pre-test	.964	90	.064
Post-test	.977	90	.102

An inspection of histograms suggested that the test scores were normally distributed for both pre-test (Figure 4.3) and post-test (Figure 4.4) scores. In line with this, the Shapiro-Wilk test demonstrated in Table 4.6 suggested that the p-value was not statistically significant ( $p > .05$ ). The implication, therefore, was that pre-test  $W_{(90)} = .96$ ,  $p = .064$  and post-test  $W_{(90)} = .98$ ,  $p = .102$  were approximately normally distributed. These results ascertained that the assumption of normality was not violated as indicated by (Dafik et al., 2023; Hamasha et al., 2022). Consequently, a  $t$ -test analysis was conducted.

#### 4.4.4 Paired Samples $t$ -test

A paired samples test compares two means from two measurements of the same sample or from two related groups on the same continuous dependent variable. The paired samples  $t$ -test reveals if there is statistical evidence that the mean difference between the pre-test and post-test scores is significantly different from zero. This study aimed to establish whether the teaching methods applied were effective.

Table 4.7 presents results of the mean gain/drop scores while the paired samples test results are indicated in Table 4.8.

**Table 4.7:** Mean gain/drop scores of learners taught using Constructive simulation (CS) and Conventional method (CM)

Group	Pre-test			Post-test			Mean gain/drop
	N	Mean	SD	N	Mean	SD	
CS	50	26.12	15.28	50	45.94	13.57	19.82
CM	40	28.65	17.18	40	25.95	22.99	-2.7

Findings in Table 4.7 indicated the treatment group taught using constructive simulation with a pre-test mean ( $\bar{X} = 26.12$ ) and a standard deviation ( $SD = 15.28$ ), and a post-test mean ( $\bar{X} = 45.94$ ) with a standard deviation ( $SD = 13.57$ ). On the other hand, the control group taught using a conventional method had a pre-test mean ( $\bar{X} = 28.65$ ) with a standard deviation ( $SD = 17.18$ ), and a post-test mean ( $\bar{X} = 25.95$ ) with a standard deviation ( $SD = 22.99$ ). For treatment group, the mean gain score was 19.82 while the control group dropped by -2.7. This implied that unlike learners

taught using constructive simulation who improved, learners taught using the conventional method declined in their learning outcomes. These findings are consistent with researchers who indicated that application of constructive simulation in learning discourse results in a higher scores as opposed to the conventional method of teaching (Bakhsh et al., 2020; Okeke, 2015).

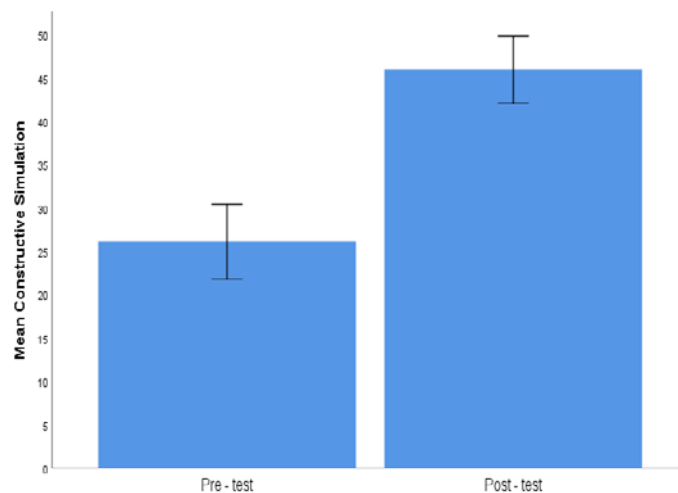
**Table 4.8:** Effectiveness of Constructive simulation (CS) and Conventional method (CM)

Paired differences								
	Mean	SD	Std. Error Mean	95% C.I. of the difference		t	df	Sig. (2-tailed)
				Lower	Upper			
CS	-19.820	14.359	2.031	-23.901	-15.739	-9.760	49	.000
CM	2700	17.099	2.704	-2.768	8.168	.999	39	.324

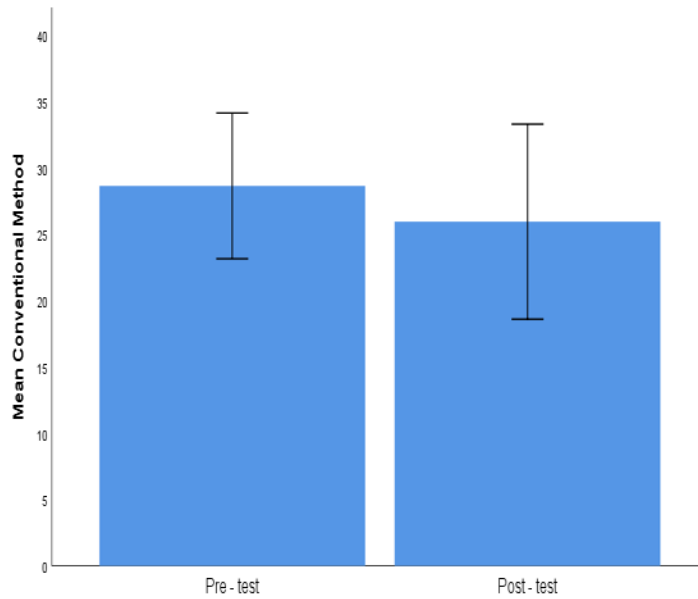
The results of the paired samples *t*-test (Table 4.8) showed that mean scores differed before treatment ( $M = 26.12$ ,  $SD = 15.28$ ) and after treatment ( $M = 45.94$ ,  $SD = 13.57$ ) at the 0.05 level of significance,  $t_{(49)} = -9.76$ ,  $n = 50$ ,  $p < 0.05$ , 95% CI for mean difference:  $-23.90$  to  $-15.74$ ,  $r = 0.510$ . On average, the mean score was about  $-19.82$  points greater than before treatment. In a paired samples test, if the difference between pre-test and post-test is negative, then the intervention had effect. The conclusion was that there was a significant difference between the pre-test and post-test scores in the treatment group (Figure 4.5). With reference to this, the results of this study indicated that utilization of constructive simulation was effective. Furthermore, the paired samples *t*-test demonstrated that the mean scores in the control group differed in the pre-test ( $M = 28.65$ ,  $SD = 17.18$ ) and post-test ( $M = 25.95$ ,  $SD = 22.99$ ) at the 0.05 level of significance,  $t_{(39)} = 0.999$ ,  $n = 40$ ,  $p > 0.05$ , 95% CI for mean difference:  $-2.768$  to  $8.168$ ,  $r = 0.673$ . Results reveal that on average, the mean score was about  $2.7$  points less. On the other hand, the difference between the pre-test and post-test in the control group was positive therefore, utilization of conventional method was ineffective. Hence, there was no

significant difference between the pre-test and post-test scores in the control group (Figure 4.6).

This means that constructive simulation, being the treatment administered significantly enhanced the learning outcomes of CRE learners as opposed to the conventional method. Discussions on effectiveness of learner centred methods versus teacher centred methods have been an area of interest for researchers. Some studies have argued that conventional methods of teaching are sufficient and effective in ensuring high learning outcomes (Pande & Bharathi, 2020; Vitorino et al., 2020). However, the results of this study showed constructive simulation to be more effective in enhancing learning outcomes of CRE compared to the conventional methods. These findings are similar to previous studies postulating that constructivist methods and more specifically constructive simulation, leads to better learning outcomes for learners in comparison to conventional methods (Bakhsh et al., 2020; Charania et al., 2021; Okeke, 2015). Unlike previous research that focus on the advantages of constructive simulation, the findings of this study results infer that, incorporating constructive simulation as a practical approach facilitates better understanding of concepts in the Gospel of Luke and consequently enhances learning outcomes.



**Figure 4.5:** Mean difference versus statistical significance in treatment group.



**Figure 4.6:** Mean difference versus statistical significance in control group.

#### **4.4.5 Independent Samples *t*-test**

An independent samples test compares mean scores between two different groups for one continuous variable. We sought to establish the magnitude of difference in the mean scores of learners in the treatment and control groups. The independent samples *t*-test revealed whether there was a significant magnitude of difference in the mean scores between learners taught using constructive simulation and conventional methods.

**Table 4.9:** Magnitude of mean difference for learners in Treatment (CS) and Control (CM) groups

Levene's test for Equality of Means							
	t	df	Sig. (2-tailed)	Mean difference	Std. Error difference	95% C.I. of the difference	
						Lower	Upper
CS vs CM	5.135	88	.000	19.99	3.893	12.254	27.726

Table 4.9 demonstrated an independent samples t-test executed to compare the magnitude of mean difference for learners in treatment and control groups. There were significant differences ( $t_{(88)} = 5.135, p = 0.000$ ) in the scores, where mean scores for constructive simulation ( $M = 45.94, SD = 13.57$ ) were higher than the conventional method ( $M = 25.95, SD = 22.99$ ). The magnitude of the differences in means (Mean Difference = 19.99, 95% CI: 12.254 to 27.726) was significant. The results revealed the difference between learning outcomes of learners taught using constructive simulation and conventional methods as statistically significant. This implied that constructive simulation outperformed the conventional method of teaching by a significant magnitude. Vitorino et al. (2020) stated that learner-centred methods of instruction result in better learning outcomes while teacher-centred methods promote rote learning hence leading to poor learning outcomes. Studies done by researchers on learner centred methods reinforce the findings of this study (Nyakito, 2018; Othoo & Aseu, 2022; Saoke et al., 2023). This research contributes to the discussion on which teaching method is more effective in enhancing learning outcomes of learners by revealing constructive simulation as operative.

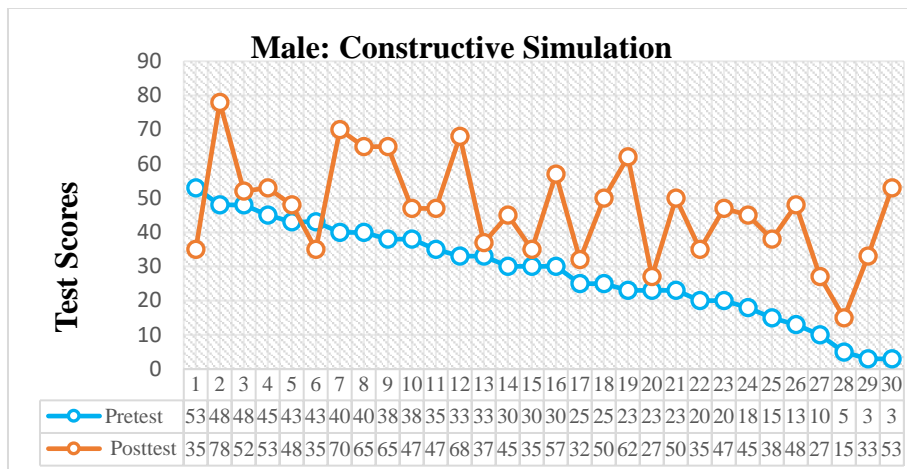
#### **4.5 Difference in Mean scores of Male and Female learners in Treatment and Control groups**

The second objective was to assess the difference in the mean scores of male and female learners taught using constructive simulation and conventional method. Therefore, the study hypothesised that there were no statistically significant differences in the mean scores of male and female learners taught using constructive

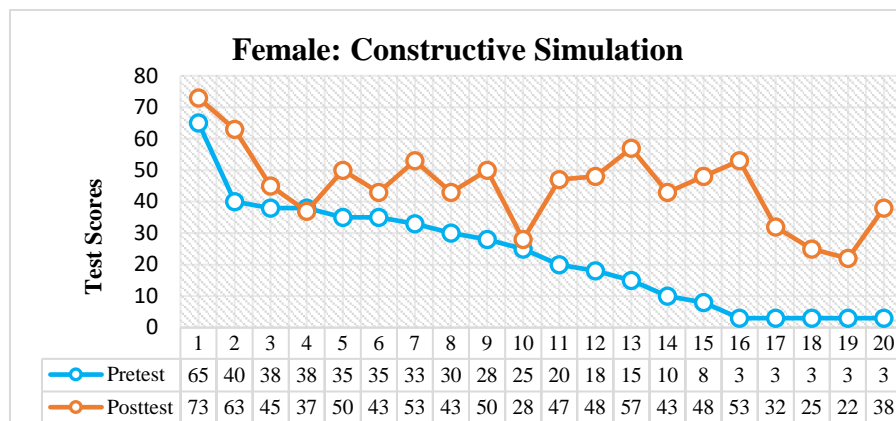
simulation and conventional method. Learner attainment tests in CRE (pre-test and post-test) were utilised as the assessment tests to achieve this objective.

#### 4.5.1 Comparison of Attainment scores of Male and Female CRE Learners in Treatment and Control groups

Figure 4.7 and Figure 4.8 illustrate a comparison of individual male and female learners' attainment scores from the pre-test and post-test assessments in the treatment and control groups consecutively.



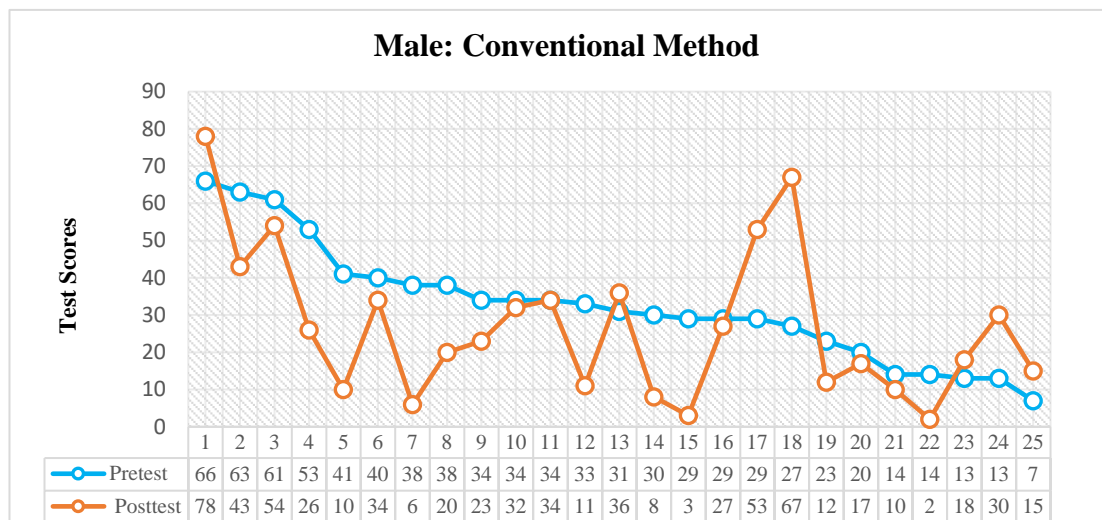
**Figure 4.7.** A graphical representation of test results arranged in descending order, according to pre-test scores of Male learners in Treatment Group.



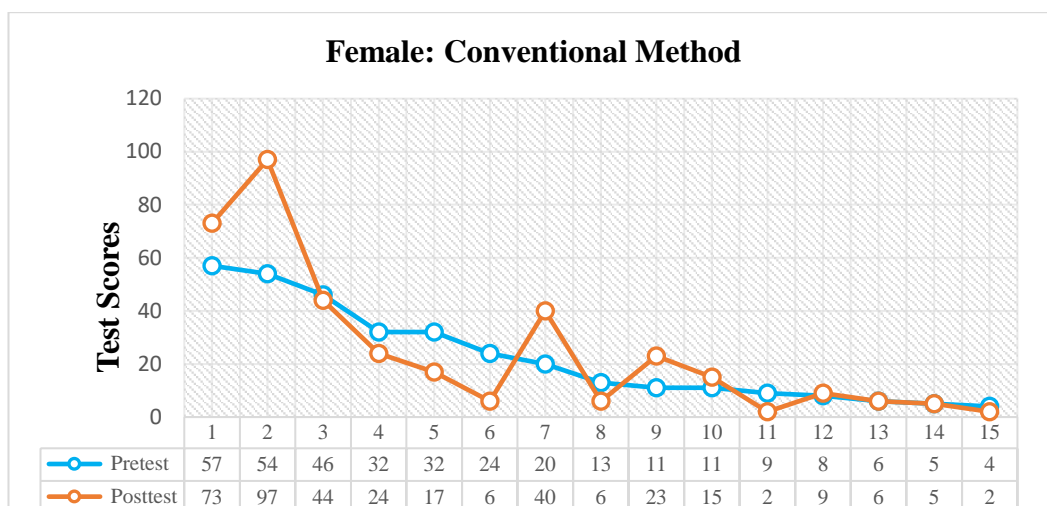
**Figure 4.8** A visual depiction of test results arranged in descending order, according to pre-test scores of Female learners in Treatment Group.

Individual pre-test and post-test scores of male learners in the treatment group are presented in Figure 4.7. One male learner (4%) achieved above average scores in the

pre-test while 29 male learners (96%) attained below-average scores. In addition, 12 male learners (40%) attained above-average scores in the post-test while the remaining eight male learners (60%) achieved below-average scores. Figure 4.8 shows individual pre-test post-test scores of female learners in the treatment group. One female learner (5%) achieved above average scores while 19 female learners (95%) recorded below-average scores. In post-test, however, seven female learners (35%) attained above average scores while 13 female learners (65%) achieved below average scores. When constructive simulation was utilised, 28 male learners (93%) improved on their scores while the remaining two male learners (7%) registered a drop. Similarly, 19 female learners (95%) improved their scores while the remaining one learner (5%) dropped. Similar to male learners, these results reflect the effectiveness of constructive simulation in enhancing learning outcomes for the majority of the female learners. When constructivist based teaching methods are utilised, learners outcomes improve irrespective of whether they are male or female (Hsieh & Yu, 2023). Furthermore, learner centred methods of learning accommodate both male and female learners hence ensuring equality in instruction, which is reflected in the learning outcomes (Yu, 2021).



**Figure 4.9.** A visual depiction of test results arranged in descending order, according to pre-test scores of Male learners in Control Group.



**Figure 4.10.** A graphical representation of test results arranged in descending order, according to pre-test scores of Female learners in Control Group.

Figure 4.9 illustrates pre-test and post-test scores for male learners in the control group. Results reveal that four male learners (16%) attained above-average scores in pre-test while 21 male learners (84%) recorded a drop. Likewise, in the post-test, four male (16%) learners achieved above average scores while the remaining 21 male learners (84%) dropped. Figure 4.10 represents pre-test and post-test scores of female learners in the control group. Results show that two female learners (14%) attained above average scores while 13 female learners (86%) achieved below average scores. Similarly, in the post-test, two learners (14%) achieved above-average scores while the remaining 13 female learners (86%) attained below average scores. When the conventional method was applied, seven male learners (28%) recorded an improvement in their scores; one male learner (4%) maintained their score while 17 male learners (68%) registered a drop. Furthermore, six female learners (40%) improved their scores; two female learners (14%) maintained their scores while the remaining seven female learners (46%) indicated a drop in their test scores. In comparison to treatment groups, the conventional method was ineffective in improving learning outcomes for the majority of both male and female learners. The relationship between passive and active methodologies has been a conversation of interest (Vitorino et al., 2020). Conventional methods put the teacher at the centre of the learning which side lines the learner in their own learning and results in poor learning outcomes (Lavi et al., 2021). In order to improve learning outcomes,

conventional methods should be complemented by learner-centred methods of learning (Chuang, 2021).

#### 4.5.2 Pearson Correlation Analysis

Pearson correlation coefficient was computed to establish the similarity of the pre-test and post-test.

**Table 4.10:** Pearson's correlation between pre-test and post-test scores in Treatment and Control groups

Group			Post-test
Constructive simulation	Pre-test	Pearson Correlation	.510**
		Sig. (2-tailed)	.000
		N	50
Conventional method	Pre-test	Pearson Correlation	.673**
		Sig. (2-tailed)	.000
		N	40

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Results in Table 4.10 reflect a strong positive link between pre-test and post-test scores of CRE learners taught using Constructive simulation ( $r = .0510, p < 0.01$ ) and CRE learners taught using the conventional Method ( $r = 0.673, p < 0.01$ ). The positive and significant relationship implies that in both the treatment and control groups, the two tests before and after were positively correlated as explained in (Hidajat, 2023).

**Table 4.11:** Correlation between pre-test and post-test scores of male and female learners in Treatment group

Group	Gender		Post-test	Post-test
Constructive simulation	Male	Pre-test	Pearson Correlation	.456*
			Sig. (2-tailed)	.011
			N	30
	Female	Pre-test	Pearson Correlation	.692**
			Sig. (2-tailed)	.001
			N	20

\*\* . Correlation is significant at the 0.01 level (2-tailed).

\* . Correlation is significant at the 0.05 level (2-tailed).

**Table 4.12:** Correlation between pre-test and post-test scores of male and female learners in the Control group

Group	Gender	Pre-test	Post-test	Post-test
Conventional method	Male	Pre-test	Pearson Correlation	.531**
			Sig. (2-tailed)	.006
			N	25
	Female	Pre-test	Pearson Correlation	.866**
			Sig. (2-tailed)	.000
			N	15

\*\* . Correlation is significant at the 0.01 level (2-tailed).

Pearson’s correlation analysis demonstrated that there was a moderate, positive and significant correlation between pre-test and post-test scores of male CRE learners ( $r = 0.456$ ,  $n = 30$ ,  $p < 0.05$ ) and female CRE learners ( $r = 0.692$ ,  $n = 20$ ,  $p < 0.01$ ) taught using constructive simulation as presented in Table 4.11. Further correlation analysis indicated that there was a moderate, positive and significant correlation between pre-test and post-test scores of male CRE learners ( $r = 0.531$ ,  $n = 25$ ,  $p < 0.01$ ) and female CRE learners ( $r = 0.866$ ,  $n = 15$ ,  $p < 0.01$ ) taught using Conventional method as shown in Table 4.12. The results of this correlation test suggested that learners who achieved high learning outcomes in the pre-test would similarly achieve high learning outcomes in the post-test as illustrated by (Tong et al., 2021).

### 4.5.3 Paired Samples *t*-test

This study aimed to establish whether the teaching methods applied were effective on male and female learners in treatment and control groups. Results of the mean gain/drop scores are presented in Table 4.13 while the paired samples test results are indicated in Table 4.14.

**Table 4.13:** Mean gain scores of Male and Female learners taught using Constructive simulation (CS) and Conventional method (CM)

Group	Gender	Pre-test			Post-test			Mean gain/drop score
		N	Mean	SD	N	Mean	SD	
CS	Male	30	28.43	13.87	30	46.63	14.42	18.2
	Female	20	22.65	16.95	20	43.90	12.61	21.25
CM	Male	25	32.56	15.68	25	26.76	19.92	- 5.8
	Female	15	22.13	18.11	15	24.60	28.08	2.47

Findings as presented in Table 4.13 show male learners in the treatment group with a pre-test mean ( $\bar{X} = 28.43$ ) and a standard deviation ( $SD = 13.87$ ) and a post-test mean ( $\bar{X} = 46.63$ ) with a standard deviation ( $SD = 14.42$ ). Their female counterparts had a pre-test mean ( $\bar{X} = 22.65$ ) with a standard deviation ( $SD = 16.95$ ) and a post-test mean ( $\bar{X} = 43.90$ ) with a standard deviation ( $SD = 12.61$ ). In the control group, male learners had a pre-test mean ( $\bar{X} = 32.56$ ) with a standard deviation ( $SD = 15.68$ ) and a post-test mean ( $\bar{X} = 26.76$ ) with a standard deviation ( $SD = 19.92$ ). Female learners, on the other hand, attained a pre-test mean ( $\bar{X} = 22.13$ ) with a standard deviation ( $SD = 18.11$ ) and a post-test mean ( $\bar{X} = 24.60$ ) with a standard deviation ( $SD = 28.08$ ). For treatment group, the mean gain score for male learners was 18.2 while that of their female counterparts was 21.25. For control group, male learners recorded a drop of -3.19 while female learners dropped by -2.16. Based on the results, when the constructive simulation teaching method was applied, female learners achieved a higher mean gain score than male learners by 3.05. Similarly, female learners taught using the conventional method had a higher mean gain score than male learners by 1.03. This shows that female learners performed better in Luke's gospel compared to male learners irrespective of the two teaching methods. Female learners have been shown to record higher scores in liberal arts (Sagala et al., 2019). CRE is a humanities subject under the liberal arts and the results of this research collaborated the previously mentioned study. Further studies revealed that female learners often excel when taught with both teacher centred and learner centred methods (Chang et al.,

2019; Hsieh & Yu, 2023). Findings of this research imply that female learners understand the concepts in the Gospel of Luke better than male learners.

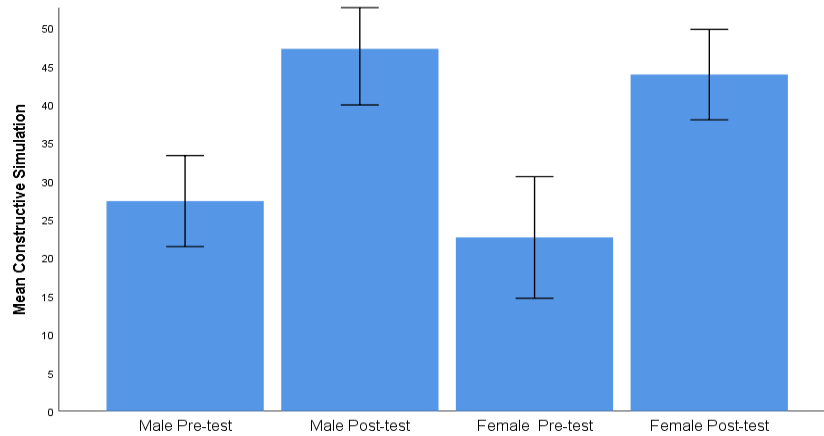
A paired samples test was computed to establish whether the intervention administered was effective. Results of the paired samples test are presented in Table 4.14.

**Table 4.14:** Effectiveness of Constructive simulation (CS) on Male and Female learners

CS	Paired Differences						t	df	Sig. (2-tailed)
	Mean	SD	Std. Error	95% C.I. of the Difference					
				Lower	Upper				
Male	-18.200	14.763	2.695	-23.713	-12.687	-6.752	29	.000	
Female	-21.250	12.260	2.741	-26.988	-15.512	-7.752	19	.000	

The paired-sample t-test (Table 4.14) revealed the mean score of male learners differed before treatment ( $M = 28.43$ ,  $SD = 13.87$ ) and after treatment ( $M = 46.63$ ,  $SD = 14.42$ ) at the 0.05 level of significance,  $t_{(29)} = -6.752$ ,  $n=30$ ,  $p < 0.05$ , 95% CI for mean difference:  $-23.713$  to  $-12.687$ ,  $r = 0.456$ . In addition, the mean score of female learners differed before treatment ( $M = 22.65$ ,  $SD = 16.95$ ) and after treatment ( $M = 43.90$ ,  $SD = 12.61$ ) at the 0.05 level of significance,  $t_{(19)} = -7.752$ ,  $n = 20$ ,  $p < 0.05$ , 95% CI for mean difference:  $-26.99$  to  $-15.51$ ,  $r = 0.692$ . For treatment, the mean score of male learners was  $-18.2$  points greater than before treatment while that of their female counterparts was  $-21.25$  points greater than before treatment. The difference between pre-test and post-test of male and female learners was negative indicating that the intervention had a positive effect. With reference to this, the results of this study indicated that utilization of constructive simulation was effective on male and female learners. The conclusion is that there was a significant difference between the pre-test and post-test scores of both male and female learners

in the treatment group (Figure 4.11). Constructive simulation, therefore, significantly improved learning outcomes for male and female learners in Luke’s gospel.



**Figure 4.11:** Mean difference versus statistical significance of male and female learners in treatment group.

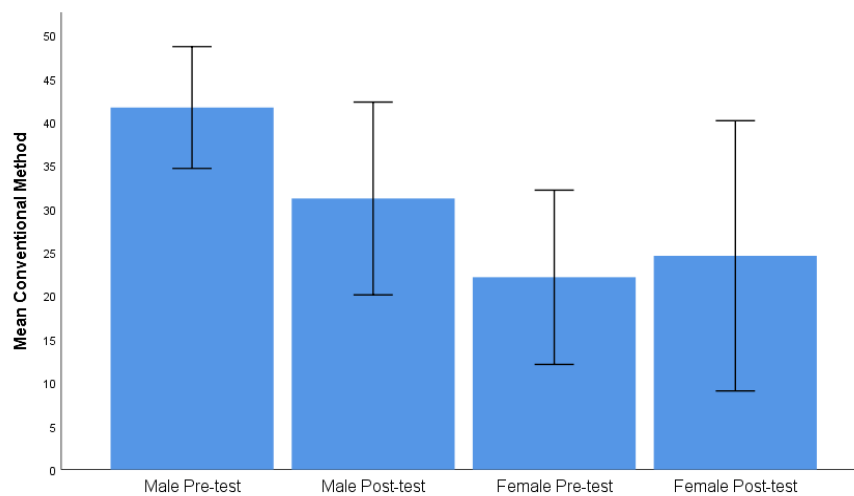
Furthermore, a paired samples test was conducted to find out if the conventional method was effective. Results of the paired samples test are presented in Table 4.15.

**Table 4.15:** Effectiveness of Conventional method (CM) on Male and Female learners

CM	Paired Differences							
	Mean	SD	Std. Error	95% C.I of the Difference		T	df	Sig. (2-tailed)
				Lower	Upper			
Male	5.800	17.640	3.528	-1.481	13.081	1.644	24	.113
Female	-2.467	15.338	3.960	-10.961	6.027	-.623	14	.543

The mean score of male learners in the control group (Table 4.15) differed in the pre-test ( $M = 32.56$ ,  $SD = 15.68$ ) and post-test ( $M = 26.76$ ,  $SD = 19.92$ ) at the 0.05 level of significance,  $t_{(24)} = 1.644$ ,  $n=25$ ,  $p > 0.05$ , 95% CI for mean difference:  $- 1.481$  to  $13.081$ ,  $r = 0.456$ . Furthermore, the mean scores of their female counterparts differed in the pre-test ( $M = 22.13$ ,  $SD = 18.11$ ) and post-test ( $M = 24.6$ ,  $SD = 28.08$ ) at the 0.05 level of significance,  $t_{(14)} = - 0.623$ ,  $n=15$ ,  $p > 0.05$ , 95% CI for mean difference:

– 10.961 to 6.027,  $r = 0.456$ . In the control group, therefore, the mean score of male learners was 5.8 points less while the mean score of the female learners was – 2.47 points greater. The difference between the pre-test and post-test scores for male learners in the control group was positive while that of female learners negative but insignificant ( $p > 0.05$ ). Therefore, the conventional method of teaching was ineffective on male and female learners. These results revealed that there was no significant negative difference between the pre-test and post-test scores of both male and female learners in the control group (Figure 4.12). For that reason, we failed to accept the alternative hypothesis.



**Figure 4.12:** Mean difference versus statistical significance of male and female learners in control group.

The study results show that unlike constructive simulation, the conventional method was unsuccessful in enhancing learning outcomes for male learners and ineffective in significantly enhancing learning outcomes for female learners in Luke’s gospel. Previous research has indicated the importance of teachers embracing teaching methods that accommodate and improve learning outcomes for both male and female learners in CRE (Bakhsh et al., 2020; Hsieh & Yu, 2023; Irfan & Bakhsh, 2023). Based on the findings of this research, when male and female learners were taught Luke’s gospel using Constructive simulation, learning outcomes improved. On the contrary, when male and female learners were taught Luke’s gospel using the conventional method, there was a drop in their learning outcomes. This study,

therefore, demonstrated constructive simulation was accommodative and effective on both male and female learners in the area of Luke’s gospel. Furthermore, some studies show that learners taught in the same learning environment and with the same teaching method should have balanced learning outcomes (Cheng et al., 2019; Vitorino et al., 2020). The study results are inconsistent with these aforementioned studies.

#### 4.4.5 Independent Samples *t*-test

Table 4.16 demonstrates an independent samples test conducted to compare the magnitude of the mean difference between male learners and female learners at end line.

**Table 4.16:** Magnitude of mean difference for Male and Female learners in Treatment (CS) and Control (CM) groups

Levene’s test for Equality of Means							
	t	df	Sig.(2-tailed)	Mean Difference	Std. Error Difference	95% C.I of the Difference	
						Lower	Upper
Male Vs Female CS	.439	48	.663	1.733	3.951	-6.210	9.464
Male Vs Female CM	.284	38	.778	2.160	7.598	-13.221	17.541

Table 4.16 demonstrates an independent samples test conducted to compare the magnitude of the mean difference between male learners and female learners who received treatment. There were no significant differences ( $t(48) = 0.439$ ,  $p = 0.663$ ) in post-test scores for males ( $M = 46.63$ ,  $SD = 14.416$ ) and females ( $M = 44.90$ ,  $SD = 12.490$ ). The magnitude of differences in means (Mean Difference = 1.733, 95% CI: - 6.210 to 9.464) was very small. In addition, post-test scores for control group (Table 4.16) established no significant differences ( $t(38) = 0.302$ ,  $p = 0.778$ ) in scores for male learners ( $M = 26.76$ ,  $SD = 19.923$ ) and female learners ( $M = 24.60$ ,  $SD = 28.078$ ). This indicated that the magnitude of differences in means (Mean Differences

= 2.160, 95% CI: - 13.221 to 17.541) was very small. Notably, at baseline, there was no statistically significant magnitude of difference in test scores of male and female learners. Likewise, when the two teaching methods were utilized in teaching the Gospel of Luke, there was no statistically significant magnitude of difference between male and female learners. The results are inconsistent with findings that indicated female learners underperform compared to their male counterparts, even when conditions are seemingly equivalent (Andayani et al., 2020). Furthermore, studies that established that female learners thrive more than male learners when learner-centered methods are utilized while male learners succeed in comparison to female learners when taught using a teacher-centered method have been contradicted (Adiansyah et al., 2023; Anggrawan et al., 2019).

#### **4.6 Learners' conceptions of the method employed in teaching and their learning outcome in Christian Religious Education**

The study established the relationship between learners' conceptions of the method of instruction utilized and their outcome in Christian Religious Education. Student questionnaires were used to accomplish this objective. The study findings on learners' conceptions towards constructive simulation and conventional methods are presented in Table 4.17 and 4.18 respectively.

The study items in Table 4.17 illustrate learners' overall conceptions of constructive simulation. A mean score of 1.0–2.4 signified negative conceptions, 2.5–3.4 signified neutral conceptions while 3.5–5.0 signified positive conceptions.

**Table 4.17:** Learners' conceptions towards Constructive simulation

Statement	SD	D	UN	A	SA	M
I enjoyed CRE lessons when Constructive simulation was utilised in teaching	0%	6%	8%	34%	52%	4.32
CRE lessons are easily understood using Constructive simulation	8%	4%	4%	28%	56%	4.02
I found the teacher more interesting when she utilised Constructive simulation compared to her method of teaching	6%	6%	6%	44%	38%	4.20
Constructive simulation enables me retain/ remember what is taught	6%	4%	2%	36%	52%	4.26
I feel that Constructive simulation has more impact on my outcome in CRE than the teacher's method of teaching	20%	12%	18%	26%	24%	3.22
I would recommend Constructive simulation as an alternative teaching method in CRE	10%	8%	8%	28%	46%	3.94
The method a teacher uses in teaching influences my outcome in CRE	6%	16%	14%	30%	34%	3.7
I would feel more confident if teachers adopted learner centred methods that involve me when learning CRE	8%	6%	8%	26%	52%	4.08
<b>Overall item mean</b>						<b>3.96</b>

SD: Strongly Disagree; D: Disagree; UN: Undecided; A: Agree; SA: Strongly Agree

**Table 4.18:** Learners' conceptions towards Conventional method

Statement	SD	D	UN	A	SA	M
I enjoyed CRE lessons with my teacher's method of teaching	7.5%	2.5%	7.5%	30%	52.5%	4.18
I find the teacher interesting when she uses her method of teaching	12.5%	2.5%	10%	47.5%	27.5%	3.75
CRE lessons are easily understood using my teacher's method of teaching	7.5%	5%	15%	25%	47.5%	4.00
The method my teacher uses in teaching enables me retain/remember what is taught	10%	5%	10%	32.5%	42.5%	3.93
The teaching method my teacher uses enables me participate in learning	10%	10%	25%	22.5%	32.5%	4.48
The method a teacher uses in teaching influences my outcome in CRE	0%	0%	5%	42.5%	52.5%	3.58
I would feel more confident if teachers adopted learner centred methods that involve me more when learning CRE	22.5%	2.5%	17.5%	22.5%	35%	3.45
<b>Overall item means</b>						<b>3.91</b>

SD: Strongly Disagree; D: Disagree; UN: Undecided; A: Agree; SA: Strongly Agree

The item with the highest score was 'I enjoyed CRE lessons when Constructive simulation was utilised in teaching' with a mean of 4.32, while the lowest scoring item was 'I feel that Constructive simulation has more impact on my outcome in CRE than the teacher's method of teaching' with a mean of 3.22. The overall item mean was 3.96, indicating that most learners in treatment group had positive conceptions of constructive simulation. Table 4.18, on the other hand, reflects learners' overall conceptions of the conventional method of teaching. The item with the highest score was 'The teaching method my teacher uses enables me participate in learning' with a mean of 4.48. The item with the lowest score was 'I would feel more confident if teachers adopted learner centred methods that involve me more when learning CRE' with a mean of 3.45. Consequently, the overall mean was 3.91, implying that majority learners in the control group had positive conceptions of the conventional method.

Likewise, as in the treatment group, most learners in the control group opined that the conventional method of instruction positively influenced their learning in CRE. An overall mean score exceeding 3.0 on a Likert scale is categorized as very high and signifies a highly positive attribute of the variable under investigation (Ramnarain & Ramaila, 2018). Learners' conceptions are an key tool in assessing the teaching and learning hence, they are critical interpreters of the impact of teaching methods on learning outcome (Aziz et al., 2012). The teacher is therefore expected to seek knowledge of how learners think and conceive learning in order to tailor learning to their needs (Adu et al., 2014). Learners in treatment group had a pre-test mean of 26.12 and a post-test mean of 45.94 while in learners in control group had a pre-test mean of 28.65 and a post-test mean of 25.95. Subsequently, learners taught using constructive simulation improved by 19.82 while learners taught using conventional method dropped by 2.7. Despite learners in treatment and control groups demonstrating very positive conceptions of constructive simulation and conventional method, learners in control group registered a mean drop. These results corroborated those of Kassem (2018) who elucidated that unsuccessful learners have little knowledge on suitable methods of approaching learning tasks and therefore, the conception they have towards a teaching method affects their comprehension either positively or negatively.

#### 4.6.1 Correlation Analysis

This research sought to establish the relationship between learners’ conceptions of teaching method employed and learning outcomes. Pearson’s Moment Correlation Coefficient was computed prior to a simple linear regression. Table 4.19 presents results of the correlation analysis.

**Table 4.19:** Pearson’s Correlation between learners’ conceptions of teaching methods and learning outcomes in CRE

Group		Learning outcomes	
Constructive simulation	Learners’ conceptions	Pearson Correlation	.252**
		Sig. (2-tailed)	.000
		N	50
Conventional method	Learners’ conceptions	Pearson Correlation	.065**
		Sig. (2-tailed)	.005
		N	40

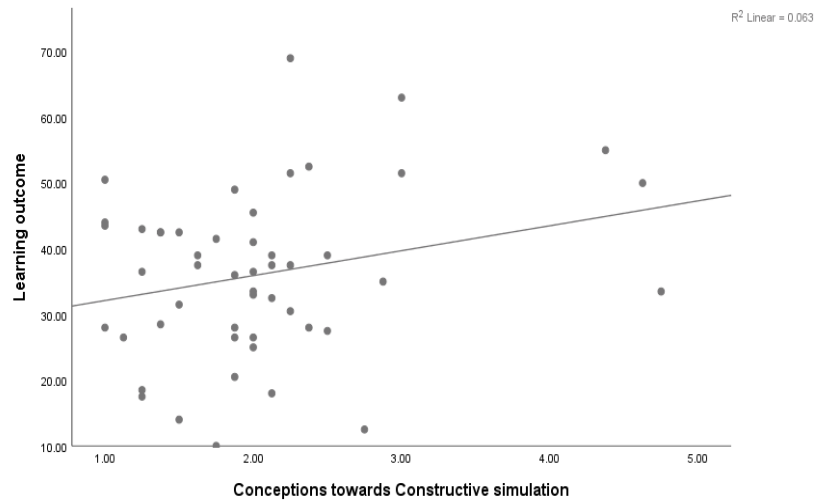
\*\* . Correlation is significant at the 0.01 level (2-tailed)

Table 4.19 reflects a strong positive relationship between learners’ conceptions and learning outcomes of learners under treatment ( $r = 0.252, p < 0.00$ ) and control ( $r = 0.065, p < 0.05$ ). The  $p$ -value of 0.00 and 0.05 were not above the 0.05 threshold, denoted that the correlation was statistically significant at the 0.01 level of significance (99% confidence level). Accordingly, learners’ conceptions played a focal role in influencing learning outcome of CRE learners. These results align with findings of Tsai et al. (2017) who established that the conceptions learners have towards a particular instructional method influences their grasp of concepts ultimately impacting their learning outcome. However, findings differed with Ndwiga et al. (2020) who established that learners’ conceptions have no effect on learning outcomes because learning outcomes are mainly influences by the method of instruction employed.

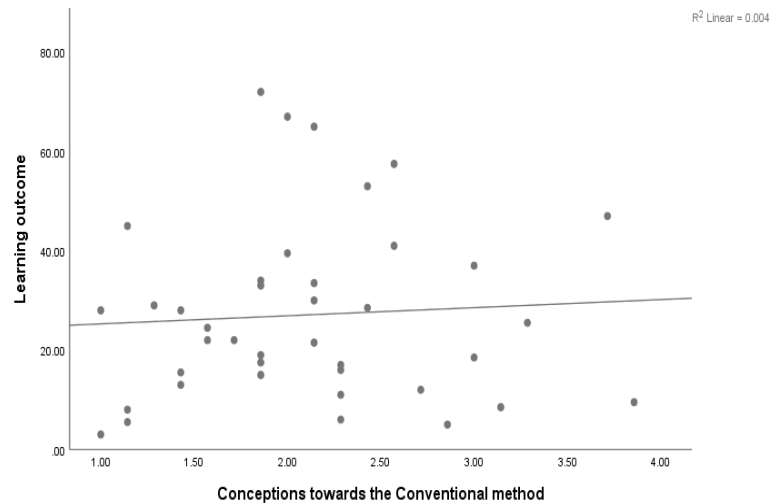
#### 4.6.2 Regression Analysis for Treatment and Control groups

This study checked that the statistical assumptions of linearity, absence of any significant outliers, normality, homoscedasticity, and independence of observations

were not violated (Rahman, 2014). This was done for the treatment group taught using constructive simulation and control group taught using the conventional method. All the assumptions were met as illustrated in Figure 4.13 and 4.14 (linearity), Table 4.20 and 4.21 (absence of any significant outliers), Figure 4.15, 4.16, 4.17 and 4.18 (normality), Figure 4.19 and 4.20 (homoscedasticity), and Table 4.22 and 4.23 (independence of observations).



**Figure 4.13:** A plot of learning outcome versus conceptions (Treatment group)



**Figure 4.14:** A plot of learning outcome versus conceptions (Control group)

Figure 4.13 and Figure 4.14 exemplify that conceptions and learning outcomes are linearly related and positive in both treatment and control groups respectively.

Therefore, as conceptions towards constructive simulation and conventional methods improve, learning outcomes are enhanced.

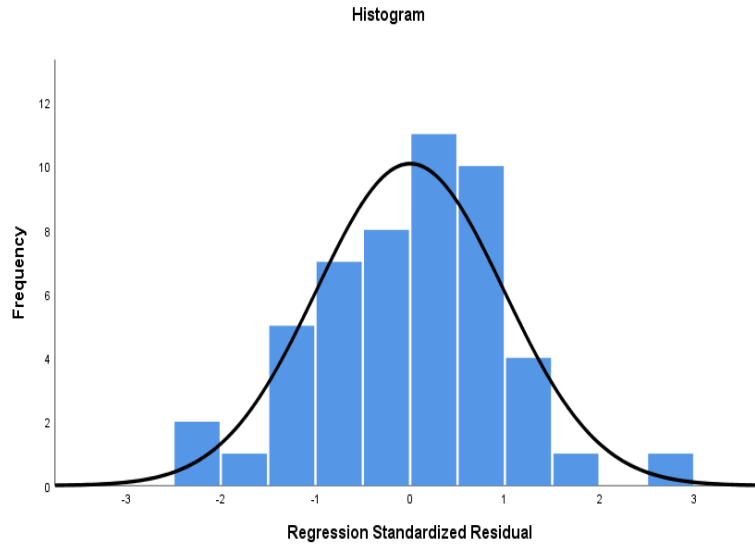
**Table 4.20:** Residual Statistics (Treatment group)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	32.1224	46.3490	36.300	3.15518	50
Residual	-26.26151	32.13537	.00000	12.13647	50
Std. Predicted Value	-1.238	3.271	.000	1.000	50
Std. Residual	-2.142	2.621	.000	.990	50

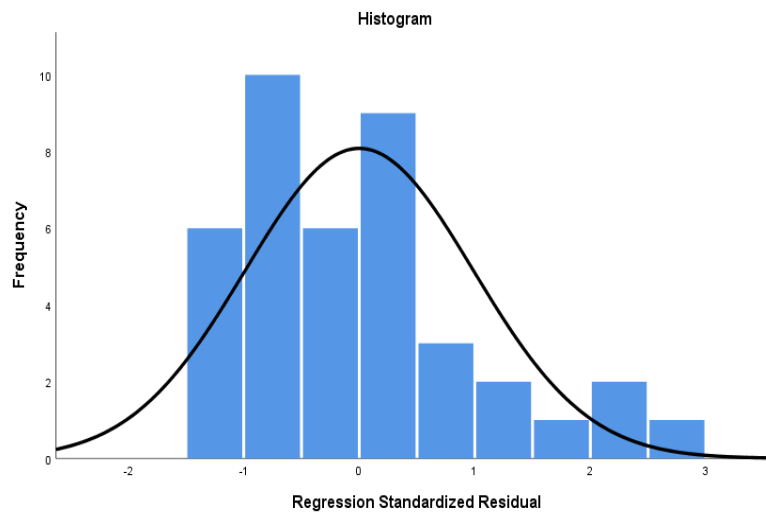
**Table 4.21:** Residual Statistics (Control group)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	25.2816	29.9419	27.0875	1.16299	40
Residual	-23.31083	45.32028	.00000	17.83485	40
Std. Predicted Value	-1.553	2.454	.000	1.000	40
Std. Residual	-1.290	2.508	.000	.987	40

The regression model is very sensitive to outliers. This is seen in the residual statistics where the minimum and maximum values for the standard residual should be between -3.29 and 3.29 (El-masri et al., 2020). If they do, there is no indication of outliers. In accordance with results in Table 4.20, the standard residual for treatment group ranged between -2.142 and 2.621 while in the control group (Table 4.21) the standard residual ranged between -1.290 and 2.508. This was an indication that, the assumption that there were no outliers in the data set was upheld for both groups.

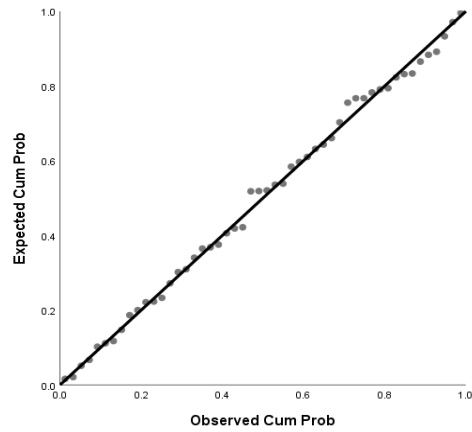


**Figure 4.15:** Normal distribution curve (Treatment group)

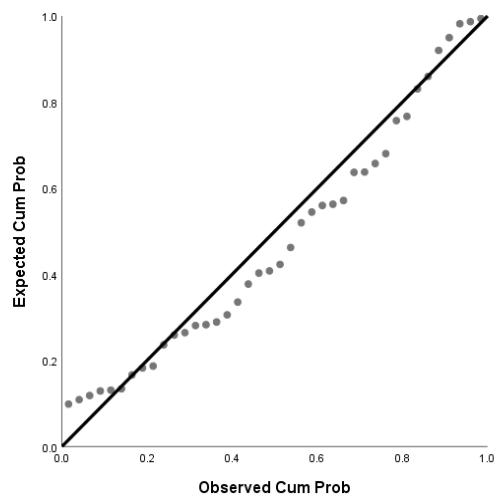


**Figure 4.16:** Normal distribution curve (Control group)

The bell-shaped curves in Figure 4.15 and Figure 4.16 suggest that the regression standardized residuals in treatment and control groups, correspondingly, were approximately normally distributed. For that reason, the assumption of normality was not violated (Hamasha et al., 2022).

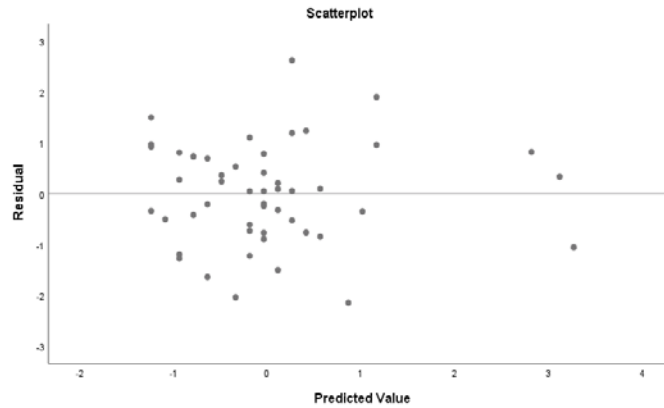


**Figure 4.17:** Normal P-P Plot for normality test (Treatment group)

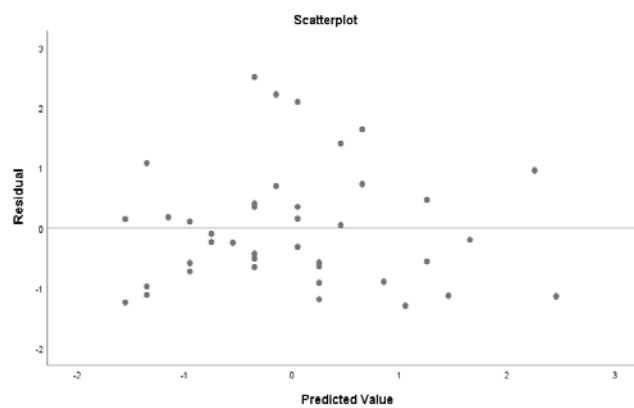


**Figure 4.18:** Normal P-P Plot for normality test (Control group)

Figure 4.17 and Figure 4.18 show that the plots for both treatment and control groups in that order, were closely distributed along the  $45^{\circ}$  fitted line hence the data was normally distributed. This further ascertained that the normality principle was upheld as indicated by (Nzomo et al., 2023).



**Figure 4.19:** Plot of Residual vs Predicted value (Treatment group)



**Figure 4.20:** Plot of Residual vs Predicted value (Control group)

Homoscedasticity allows for the accurate interpretation of the model's coefficients and standard errors, ensuring the validity of the model's inferences (Kouam & William, 2024). With reference to Figure 4.19 (Treatment group) and Figure 4.20 (Control group), the scatter plots converge around the zero point. These findings are indication that the size of the residuals were constant across the two data sets hence exhibiting homoscedasticity. Additionally, for there to be independence of observations, values between 1.5 and 2.5 are tenable (Awan, 2020). Table 4.22 indicates the Durbin-Watson test value for the treatment group as 1.61. On the other hand, the Durbin-Watson test value for the control group (Table 4.23) is 1.27. These results implied that there was no autocorrelation in either group, thus satisfying the assumption of independence.

Since all the expected assumptions were met as illustrated above, regression analysis could be conducted. This section presents the results of the model fitness, ANOVA and distribution of coefficients. The fitness of the model for treatment and control groups are presented in Table 4.22 and Table 4.23 respectively.

**Table 4.22:** Model fitness of Learners' conceptions vs learning outcomes (Treatment group)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.252 <sup>a</sup>	.063	.044	12.26224	1.61

a. Dependent Variable: Learning outcome

**Table 4.23:** Model fitness of Learners' conceptions vs learning outcome (Control group)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.065 <sup>a</sup>	.004	-.022	18.06800	1.27

a. Dependent Variable: Learning outcome

The R-value is the correlation coefficient whereas  $R^2$  is the coefficient of determination, which designates the percentage of variability in the outcome variable explained by the predictor variable (Saoke et al., 2023).  $R^2$  is used when there is one independent variable Harsono et al. (2021), as was the case in this study. The coefficient of determination must fall between 0 and 1 to be regarded as significant (Simba et al., 2016). According to Table 4.22,  $R = 0.252$  while  $R^2 = 0.063$  for treatment group. These findings suggest that 6.3% of learning outcomes in CRE were predictable from their conceptions towards constructive simulation. The remaining 93.7% can be accounted for by other factors not considered by the study model. On the other hand, in control group (Table 4.23),  $R = 0.065$  while  $R^2 = 0.004$ . This is an indication that learners' conceptions towards the conventional method predicted 0.4% of their learning outcomes in CRE. The remaining 99.6% can be attributed to

factors not addressed by the study model. Method of instruction used by teachers, gender as well as teachers' competency and ability to create an inclusive learning environment are some of the factors that researchers have established have an impact on learning outcome. The achievement of desirable outcomes depends on the method of instruction therefore educators have a responsibility of using methods that ensure active learner participation which in turn improves learning outcome (Filho et al., 2018). Okeke (2015) explained that the interaction of gender with the method of teaching contributes to poor learning outcomes in religious education. The pedagogical competence of a CRE teacher can significantly impact learners' acquisition of values and skills, ultimately influencing their learning outcomes (Othoo & Aseu, 2022; Saoke et al., 2022).

The Analysis of Variance establishes whether the model works or not by indicating if, the predictor variable significantly envisages the outcome variable (Nzomo et al., 2023; Saoke et al., 2023). The study therefore hypothesised that there was a statistically significant relationship between learners' conceptions of the teaching method employed in teaching and their learning outcome in CRE. The ANOVA results for both treatment and control groups are presented in Table 4.24 and Table 4.25.

**Table 4.24:** ANOVA: Conceptions towards Constructive simulation vs Learning outcomes (Treatment group)

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	487.802	1	487.802	3.244	.005 <sup>b</sup>
	Residual	7217.403	48	150.363		
	Total	7705.205	49			

b. Predictors: (Constant), Conceptions

**Table 4.25:** ANOVA: Conceptions towards Conventional method vs learning outcomes (Control group)

Model		Sum of squares	df	Mean Square	F	Sig.
1	Regression	52.749	1	52.749	.162	.002 <sup>b</sup>
	Residual	12405.195	38	326.452		
	Total	12457.944	39			

b. Predictors: (Constant), Conceptions

Table 4.24 demonstrates that the model for treatment group was statistically significant at  $F(1, 48) = 3.244$ ,  $p = .005$  while the model for control group was significant at  $F(1, 38) = 0.162$ ,  $p = .002$  as shown in Table 4.25. This implies that learner conceptions of constructive simulation and conventional methods satisfactorily and significantly predicted their learning outcomes in CRE.

Furthermore, the regression coefficients for treatment and control groups were calculated and the findings presented in Table 4.26 and Table 4.27 correspondingly. The regression equation is  $y = mx + b$  where  $m$  = slope or coefficient and  $b$  = constant or y-intercept.

**Table 4.26:** Distribution of Coefficients in Treatment group

Model		Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	28.329	4.614		6.140	.000	19.052	37.606
	Conceptions	3.794	2.106	.252	1.801	.005	– .441	8.029

**Table 4.27:** Distribution of Coefficients in Control group

Model		Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	23.651	9.015		2.623	.012	5.401	41.900
	Conceptions	1.631	4.058	.065	.402	.001	6.583	9.846

Table 4.26 has provided the slope ( $m = 3.794$ ) and constant ( $b = 28.329$ ) values for the regression model in treatment group. Consequently, the equation line is  $y = 3.794x + 28.329$ . Similarly, Table 4.27 has indicated the slope ( $m = 1.631$ ) and constant ( $b = 23.651$ ) values for the regression model in control group. Therefore, the equation line is  $y = 1.631x + 23.651$ . Furthermore, the results suggest a weak and moderate positive relationship between conceptions of constructive simulation ( $\beta = 0.252, p < 0.05$ ) and conventional method ( $\beta = 0.065, p < 0.05$ ), and learning outcome of CRE. As a result, we accepted the alternative hypothesis.

For the slope to predict learning outcomes from conceptions towards constructive simulation, the range is from a minimal of  $-0.441$  to  $8.029$ . Likewise, for the slope to predict learning outcomes from conceptions towards the conventional method, the range is from a minimal of  $6.583$  to  $9.846$ . These findings imply that for each unit of increase in learners' conceptions towards constructive simulation, learning outcomes in CRE increase by  $0.4$  to  $8$  points. The results further infer that for each unit of increase in learners' conceptions towards the conventional method, learning outcomes in CRE increase by  $6.6$  to  $9.8$  points in relation to the negligible error associated. The results are consistent with Adu et al. (2014) and Kassem (2018) who found a significant relationship between learners' conceptions and learning outcomes.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents the summary of the findings, conclusion, policy recommendations and suggestions for further studies.

#### 5.2 Summary of the research findings

This section presents a summary of the study's findings based on the research objectives, which include i. Evaluating the difference in the mean scores of learners taught using Constructive simulation and Conventional method; ii. Examining teachers' conceptions of teaching methods utilized in Christian Religious Education; iii. To establish the relationship between learners' conceptions of the method employed in teaching and their learning outcome in Christian Religious Education.

##### 5.2.1 Difference in the mean scores of learners taught using Constructive simulation and Conventional method

The study evaluated the difference in the mean scores of CRE learners taught using constructive simulation and conventional method in Embu West Sub-County. The study's findings showed that learners educated using constructive simulation attained a mean gain of 19.82 while learners taught using conventional method registered a drop of - 2.7. Moreover, the study established that constructive simulation ( $t_{(49)} = -9.76$ ,  $n = 50$ ,  $p < 0.05$ ) outperformed the conventional method ( $t_{(39)} = 2.700$ ,  $n = 40$ ,  $p < 0.324$ ) in terms of effectiveness. Additionally, there was a statistically significant difference between the pre-test and post-test scores in the treatment group while there was no statistically significant negative difference between the pre-test and post-test scores in the control group. Furthermore, there were significant differences ( $t_{(88)} = 5.135$ ,  $p = 0.000$ ) in the scores, where mean scores for constructive simulation ( $M = 45.94$ ,  $SD = 13.57$ ) were higher than the conventional method ( $M = 25.95$ ,  $SD = 22.99$ ). The magnitude of the differences in means (Mean Difference = 19.99, 95% CI: 12.254 to 27.726) was significant. Based on the findings, constructive simulation, being the treatment administered significantly enhanced the learning outcomes in

CRE learners as opposed to the conventional method. However, the conventional method failed to improve learning outcomes in CRE.

### **5.2.2 Difference in the mean scores of learners taught using Constructive simulation and Conventional method**

The study assessed the difference in the mean scores of male and female CRE learners taught using constructive simulation and conventional method. The study's findings showed that male learners educated using constructive simulation attained a mean gain of 18.2. Likewise, their female counterparts improved by 21.25. On the other hand, male learners taught using conventional method registered a drop of -5.8 while the female learners improved by 2.47. The study established that constructive simulation was effective in enhancing learning outcomes for both male and female learners at ( $t_{(29)} = -18.2$ ,  $n = 30$ ,  $p < 0.00$ ) and ( $t_{(19)} = -21.25$ ,  $n = 20$ ,  $p < 0.00$ ) respectively. Furthermore, the conventional method was ineffective in enhancing learning outcomes for male learners ( $t_{(24)} = 5.8$ ,  $n = 25$ ,  $p < 0.113$ ). Contradictorily, the conventional method was effective in enhancing learning outcomes for female learners ( $t_{(14)} = -2.467$ ,  $n = 15$ ,  $p < 0.543$ ). However, this improvement was not statistically significant. Additionally, there was a statistically significant difference between the pre-test and post-test scores of male and female learners in the treatment group. Moreover, there were no statistically significant differences between the pre-test and post-test scores of male learners and female learners in the control group. Based on the findings, constructive simulation, being the treatment administered significantly enhanced the learning outcomes of male and female learners in CRE learners as opposed to the conventional method.

### **5.2.3 Relationship between learners' conceptions of the method of instruction employed and their learning outcome in Christian Religious Education**

The study established the relationship between learners' conceptions of the method employed in teaching and their outcome in Christian Religious Education. Findings of the study, through computation of the Pearson's moment correlation coefficient suggests a strong positive relationship between learners' conceptions and learning outcomes of learners under treatment ( $r = 0.252$ ,  $p < 0.00$ ) and control ( $r = 0.065$ ,  $p < 0.05$ ). Results of the regression analysis showed that for treatment group,  $R = 0.252$

while  $R^2 = 0.063$ . These findings imply that 6.3% of learning outcomes in CRE were predictable from their conceptions towards constructive simulation. The remaining 93.7% can be accounted for by other factors not considered by the study model. On the other hand, in control group,  $R = 0.065$  while  $R^2 = 0.004$ . This is an indication that learners' conceptions towards the conventional method predicted 0.4% of their learning outcomes in CRE. The remaining 99.6% can be attributed to factors not addressed by the study model. The model for treatment and control groups were significant at  $F(1, 48) = 3.244, p = .005$  and  $F(1, 38) = 0.162, p = .002$  correspondingly. This implies those learners' conceptions of constructive simulation and conventional methods satisfactorily predicted their learning outcomes in CRE. Furthermore, the results suggest a positive relationship between conceptions towards constructive simulation ( $\beta = 0.252, p < 0.05$ ) and conventional methods ( $\beta = 0.065, p < 0.05$ ), and learning outcomes of CRE.

### **5.3 Conclusion**

This study assessed the impact of constructive simulation on the learning outcomes of CRE by conducting a quasi-experimental study, comparing it to the conventional teaching method. The findings of the research revealed that constructive simulation enhances learning outcomes in CRE, suggesting its potential applicability in various subjects and contexts. The results suggest that male and female learners taught using constructive simulation significantly improved their learning outcomes as opposed to the conventional method. However, these conceptions did not necessarily reflect through the learning outcomes of learners notably in the control group. On the other hand, there was a relationship between learners' conceptions of teaching method and learning outcome in CRE. Results of the study indicated that teachers have a responsibility to scrutinize their deeply held teaching philosophies, particularly their perceptions of different instructional methods. Additionally, there is need to create an inclusive learning environment by tailoring learning according to the needs of learners.

Vygotsky's social cognitive theory underscores the significance of active learner involvement and peer interaction within the learning environment. Given the ongoing transition towards a Competency-Based Curriculum, integrating more

learner centred methods becomes essential to ensure learners acquire the requisite knowledge, skills, and attitudes for holistic societal participation. Encouraging learner engagement enables them to build upon their existing knowledge while constructing new insights, fostering inclusive and productive teaching-learning interactions, ultimately resulting in enhanced learning outcomes. Educators must also familiarize themselves with the learning theories of Vygotsky and Dewey to enhance their proficiency and competence. Equipped with this knowledge, educators can effectively cater to conceptions of learners, diverse learning styles and establish inclusive learning environments.

#### **5.4 Policy Recommendations**

Based on the findings, the study has put forward the following policy recommendations:

1. It is imperative for policy makers, including entities like the Ministry of Education and KICD, to incorporate constructive simulation into curriculum design and when formulating educational policies, prioritizing learner centred approaches that foster active learner participation ultimately improving learning outcomes.
2. Educators should take into account the influence of gender on teaching and learning.
3. Furthermore, understanding the importance of reflective practice by educators and seeking of learners' conceptions towards their preferred methods of instruction enables them tailor learning experiences to individual learner needs and inform strategies to improve these conceptions.
4. There is pressing need to institute pre-service and in-service training programs geared towards enriching educators' grasp of learner centred techniques, with particular emphasis on constructive simulation. Educators should be educated on the benefits and impact of such approaches to the teaching-learning dynamic and learner development.

#### **5.5 Suggestions for further studies**

The study did come with certain limitations. In view of this, subsequent research should:

1. Undertake similar studies using designs that are more robust such as randomized trials at the classroom level and quasi-experimental designs incorporating controls that are more sophisticated and larger sample sizes.
2. Carry out a similar study on gendered differences that influence learning outcomes with learners' conceptions being a factor.
3. Conduct similar research in diverse settings to evaluate the influence of conceptions towards different learner centred methods on learning outcomes and compare them to conceptions towards conventional methods.
4. Explore the most effective mechanisms within the constructive simulation framework and assess its efficacy and conceptions in various subjects and contexts.

## REFERENCES

- Adiansyah, R., Muh. Amin, A., Yani, A., & Safitri, D. (2023). The correlation between metacognitive awareness and cognitive learning outcomes based on gender of biology education students. *Biosfer*, 16(2), 244–259. <https://doi.org/10.21009/biosferjpb.26765>
- Adikinyi, A. A. (2017). *Teacher-related Factors Influencing Christian Religious Education Curriculum Implementation in Public Secondary Schools in Westlands Sub County, Nairobi, Kenya*.
- Adu, E. O., Galloway, G., & Olaoye, O. (2014). Teachers' characteristics and students' Attitude towards Economics in secondary schools: Students' perspectives. *Mediterranean Journal of Social Sciences*, 5(16), 455–462. <https://doi.org/10.5901/mjss.2014.v5n16p455>
- Ahmad, N. A., Azizan, F. L., Rahim, N. F., Jaya, N. H., Shaipullah, N. M., & Siaw, E. S. (2017). Relationship between Students' Perception toward the Teaching and Learning Methods of Mathematics' Lecturer and Their Achievement in Pre-University Studies. *International Education Studies*, 10(11), 129. <https://doi.org/10.5539/ies.v10n11p129>
- Akhigbe, J. N., & Adeyemi, A. E. (2020). Using gender responsive collaborative learning strategy to improve students' achievement and attitude towards learning science in virtual and hands-on laboratory environment. *Journal of Pedagogical Research*, 4(3), 241–261. <https://doi.org/10.33902/JPR.2021063948>
- Albalawi, A. S. (2018). The effect of using flipped classroom in teaching calculus on students' achievements at university of Tabuk. *International Journal of Research in Education and Science*, 4(1), 198–207. <https://doi.org/10.21890/ijres.383137>
- Aldrich, C. (2003). *Simulations and the future of learning: An innovative (and perhaps revolutionary) approach to e-learning*. John Wiley & Sons.
- Anagün Assoc, Ş. S., & Osmangazi Üniversitesi, E. (2018). Teachers' Perceptions about the Relationship between 21st Century Skills and Managing Constructivist Learning Environments. In *International Journal of Instruction* (Vol. 11, Issue 4). [www.e-iji.net](http://www.e-iji.net)
- Andayani, S., Muchtar, H., Yufiarti, & Susanto, E. (2020). The profile of critical thinking and learning outcomes of teacher candidates viewed from gender differences. *Journal of Physics: Conference Series*, 1567(4). <https://doi.org/10.1088/1742-6596/1567/4/042072>
- Anggrawan, A., Ibrahim, N., Muslim, S., & Satria, C. (2019). Interaction between Learning Style and Gender in Mixed Learning with 40% Face-to-face Learning and 60% Online Learning. In *IJACSA) International Journal of Advanced*

- Arnodah Itolondo, W. (2012). The Role and Status of Christian Religious Education in the School Curriculum in Kenya. *Journal of Emerging Trends in Educational Research and Policy Studies*, 3(5), 721–729. <http://www.opsi.gov.uk/acts/ukga>
- Asy'ari, M., Fitriani, H., Zubaidah, S., & Mahanal, S. (2019). The science process skills of prospective biology teachers in plant cell material based on gender. *International Journal of Emerging Technologies in Learning*, 14(19), 168–178. <https://doi.org/10.3991/ijet.v14i19.11208>
- Awan, W. A. (2020). *encountering and keeping behaviour of post-graduate students of social sciences in an online environment*. 21–45. <https://doi.org/10.1108/OIR-08-2020-0331>
- Aziz, A. A., Yusof, K. M., & Yatim, J. M. (2012). Evaluation on the Effectiveness of Learning Outcomes from Students' Perspectives. *Procedia - Social and Behavioral Sciences*, 56(Ictthe), 22–30. <https://doi.org/10.1016/j.sbspro.2012.09.628>
- Bakhsh, K., Arshad, M., & Rasool, S. (2020). The Role of Constructive Simulation Towards Students' Academic Performance in Secondary Schools. *International Journal of Innovation, Creativity and Change*, 14(12), 841–854.
- Baraka Manjale Ngussa, & Makewa, L. N. (2018). The role of christian religious education on secondary school student discipline in lake zone, tanzania. *Journal of Research Innovation and Implications in Education*, 2(1), 1–7.
- Best, J. W., & Kahn, J. V. (2006). *Research in education*, 10th. New Delhi: PHI Learning Private Ltd, 10–12.
- Bidwell, K., & Watine, L. (2014). Exploring Early Education Programs in Peri-urban Settings in Africa: *Optimus Impact*, 5, 3–19.
- Bolton, G. (2010). *Reflective practice: Writing and professional development*. Sage publications.
- Chang, F., Luo, M., Walton, G., Aguilar, L., & Bailenson, J. (2019). Stereotype threat in virtual learning environments: Effects of avatar gender and sexist behavior on women's math learning outcomes. *Cyberpsychology, Behavior, and Social Networking*, 22(10), 634–640. <https://doi.org/10.1089/cyber.2019.0106>
- Charania, A., Bakshani, U., Paltiwale, S., Kaur, I., & Nasrin, N. (2021). Constructivist teaching and learning with technologies in the COVID-19 lockdown in Eastern India. *British Journal of Educational Technology*, 52(4), 1478–1493. <https://doi.org/10.1111/bjet.13111>
- Chebet, C. (2017). *teachers' knowledge and skills on the use of life approach in teaching Christian Religious Education* (Vol. 87, Issue 1,2).

- Cheng, L., Ritzhaupt, A. D., & Antonenko, P. (2019). Effects of the flipped classroom instructional strategy on students' learning outcomes: a meta-analysis. *Educational Technology Research and Development*, 67(4), 793–824. <https://doi.org/10.1007/s11423-018-9633-7>
- Chu, PH. and Chang, Y. (2017). John W, Creswell, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. *Journal of Social and Administrative Sciences*, 4(June), 3–5.
- Chuang, S. (2021). The Applications of Constructivist Learning Theory and Social Learning Theory on Adult Continuous Development. *Performance Improvement*, 60(3), 6–14. <https://doi.org/10.1002/pfi.21963>
- Ciechanowski, L., Przegalinska, A., Magnuski, M., & Gloor, P. (2019). In the shades of the uncanny valley: An experimental study of human–chatbot interaction. *Future Generation Computer Systems*, 92, 539–548. <https://doi.org/10.1016/j.future.2018.01.055>
- Dafik, Kadir, Maryati, T. K., Sufirman, & Ridlo, Z. R. (2023). The analysis of the implementation of RBL-STEM learning materials in improving student's meta-literacy ability to solve wallpaper decoration problems using local antimagic graph coloring techniques. *Heliyon*, 9(6). <https://doi.org/10.1016/j.heliyon.2023.e17433>
- Dahlia Yuliskurniawati, I., Ika Noviyanti, N., Rosyadah Mukti, W., Mahanal, S., & Zubaidah, S. (2019). Science process skills based on genders of high school students. *Journal of Physics: Conference Series*, 1241(1). <https://doi.org/10.1088/1742-6596/1241/1/012055>
- Dami, Z., Butarbutar, M., & Kusradi, S. W. (2023). Two different models of pedagogy: Rethinking teachers' pedagogy competency in Christian religious education. *International Journal of Christianity & Education*, 27(2), 142–167.
- Denzin, N. K., Lincoln, Y. S., Giardina, M. D., & Cannella, G. S. (2023). *The Sage handbook of qualitative research*. Sage publications.
- Development, K. I. of C. (2021). *Republic of Kenya Ministry of Education Upper Primary Level Designs Subject Christian Religious Education Grade 6* (Issue January).
- Dewey, J. (1986). Experience and education. *The Educational Forum*, 50(3), 241–252.
- Dole, S., Bloom, L., & Kowalske, K. (2015). Transforming Pedagogy : Changing Perspectives from Teacher-Centered to Learner-Centered The Interdisciplinary Journal of Problem-based Learning Transforming Pedagogy : Changing Perspectives from Teacher-Centered to Learner-Centered. *Interdisciplinary Journal of Problem-Based Learning*, 10(1).

- Education, M. of. (2020). *Basic Education Statistical Booklet*.
- Education, N. (n.d.). Research Development Council.(2008). *Junior Secondary School Curriculum: Religion and National Values-JSS 1, 3*.
- El-masri, M. M., Mowbray, F. I., Fox-wasylyshyn, S. M., & Kanters, D. (2020). *Multivariate Outliers : A Conceptual and Practical Overview for the Nurse and Health Researcher*. <https://doi.org/10.1177/0844562120932054>
- Elfert, M. (2019). Lifelong learning in Sustainable Development Goal 4: What does it mean for UNESCO's rights-based approach to adult learning and education? *International Review of Education*, 65(4), 537–556. <https://doi.org/10.1007/s11159-019-09788-z>
- Embu County Government. (2018). *Embu County Integrated Development Plan*.
- Erbil, D. G. (2020). A Review of Flipped Classroom and Cooperative Learning Method Within the Context of Vygotsky Theory. In *Frontiers in Psychology* (Vol. 11). Frontiers Media S.A. <https://doi.org/10.3389/fpsyg.2020.01157>
- Etuk, E. N., Afangideh, M. E., & Uya, A. O. (2013). Students' perception of teachers' characteristics and their attitude towards mathematics in oron education zone, Nigeria. *International Education Studies*, 6(2), 197–204. <https://doi.org/10.5539/ies.v6n2p197>
- Eun, B. (2019). Adopting a stance: Bandura and Vygotsky on professional development. *Research in Education*, 105(1), 74–88. <https://doi.org/10.1177/0034523718793431>
- Filho, W., Raath, S., Lazzarini, B., Vargas, V. R., de Souza, L., Anholon, R., Quelhas, O. L. G., Haddad, R., Klavins, M., & Orlovic, V. L. (2018). The role of transformation in learning and education for sustainability. *Journal of Cleaner Production*, 199, 286–295. <https://doi.org/10.1016/j.jclepro.2018.07.017>
- Forman, F. A., & College, C. (2019). *Article Journal of Education and Educational Development Activity-Based Teaching, Student Motivation and Academic Achievement* (Vol. 6, Issue 1).
- Frey, B. B. (2018). *The SAGE encyclopedia of educational research, measurement, and evaluation*. Sage publications.
- Gale, R. C., Wu, J., Erhardt, T., Bounthavong, M., Reardon, C. M., Damschroder, L. J., & Midboe, A. M. (2019). Comparison of rapid vs in-depth qualitative analytic methods from a process evaluation of academic detailing in the Veterans Health Administration. *Implementation Science*, 14(1). <https://doi.org/10.1186/s13012-019-0853-y>
- Ganyaupfu, E. M. (2013). Teaching Methods and Students' Academic Performance. *International Journal of Humanities and Social Science Invention ISSN (Online)*,

- George, D., & Mallery, P. (2019). *IBM SPSS statistics 26 step by step: A simple guide and reference*. Routledge.
- Gitiha, R. W., Rugano, P., Wakhu, S., & Muriithi, C. G. (2024). Students' perceptions towards the uptake of educational technologies in Christian Religious Education. *Cogent Education*, 11(1). <https://doi.org/10.1080/2331186X.2024.2310968>
- Goi, C. L. (2019). The use of business simulation games in teaching and learning. *Journal of Education for Business*, 94(5), 342–349. <https://doi.org/10.1080/08832323.2018.1536028>
- Goldenberg, D., Andrusyszyn, M.-A., & Iwasiw, C. (2005). The effect of classroom simulation on nursing students' self-efficacy related to health teaching. *Journal of Nursing Education*, 44(7), 310–314.
- Gopalan, M., Rosinger, K., & Ahn, J. Bin. (2020). Use of Quasi-Experimental Research Designs in Education Research: Growth, Promise, and Challenges. *Review of Research in Education*, 44(1), 218–243. <https://doi.org/10.3102/0091732X20903302>
- Gredler, M. E. (2004). Games and simulations and their relationship to learning In DH Jonassen (Ed.), *Handbook of research on educational communication and technology*, (pp. 571-581). New Jersey, US: Lawrence Erlbaum Associates Publishers.
- Greenberger, S. W., & Or, J. (2022). Cultivating faculty readiness to reflect: reconstructing Dewey's attitudes for reflection as character strengths. *Reflective Practice*, 23(3), 291–304. <https://doi.org/10.1080/14623943.2021.2015685>
- Hamasha, M. M., Ali, H., Hamasha, S., & Ahmed, A. (2022). Ultra-fine transformation of data for normality. *Heliyon*, 8(5). <https://doi.org/10.1016/j.heliyon.2022.e09370>
- Harsono, Y., Fajarianto, O., Pamulang, U., Surya, J., No, K., Barat, P., Pamulang, K., & Selatan, K. T. (2021). *Strategy for Improving the Quality of Human Resources to Improve the Performance of Small and Medium Enterprises in Kepulauan Seribu*, North Jakarta. 584(Icorsh 2020), 382–392.
- Hasan, A. S. (2000). Learners' perceptions of listening comprehension problems. *Language, Culture and Curriculum*, 13(2), 137–153. <https://doi.org/10.1080/07908310008666595>
- Hidajat, F. A. (2023). A comparison between problem-based conventional learning and creative problem-based learning on self-regulation skills: Experimental study. *Heliyon*, 9(9). <https://doi.org/10.1016/j.heliyon.2023.e19512>

- Holmes, B., Tangney, B., Fitzgibbon, A., Savage, T., & Mehan, S. (2001). Communal Constructivism : Students constructing learning for as well as with others . A search for an appropriate model of education. *Society for Information Technology & Teacher Education International Conference, MARCH*, 3114–3119. <http://www.editlib.org/p/17346/>
- Hsieh, T. L., & Yu, P. (2023). Exploring achievement motivation, student engagement, and learning outcomes for STEM college students in Taiwan through the lenses of gender differences and multiple pathways. *Research in Science and Technological Education*, 41(3), 1072–1087. <https://doi.org/10.1080/02635143.2021.1983796>
- Hubalovsky, S. (2015). System Approach, Modeling, Simulation as Educational Technologies in Algorithm Development and Programming. *Procedia - Social and Behavioral Sciences*, 191, 2226–2230. <https://doi.org/10.1016/j.sbspro.2015.04.267>
- Hyslop-margison, E. J., & Strobel, J. (2007). Constructivism and education: misunderstandings and pedagogical implications. *Tyler and Francis*, 43:1(72–86). <https://doi.org/10.1080/08878730701728945>
- Ibe, E., & Abamuche, J. (2019). Effects of audiovisual technological aids on students' achievement and interest in secondary school biology in Nigeria. *Heliyon*, 5(6). <https://doi.org/10.1016/j.heliyon.2019.e01812>
- Iqbal, Z. (2020). Effectiveness of Cooperative Learning Technique for the Subject of Science at Elementary Level. *Pakistan Social Sciences Review*, 4(II), 67–77. [https://doi.org/10.35484/pssr.2020\(4-ii\)06](https://doi.org/10.35484/pssr.2020(4-ii)06)
- Irfan, M., & Bakhsh, D. R. (2023). Student Performance And Constructive Simulation: An Experimental Study. In *Journal of Positive School Psychology* (Vol. 2023, Issue 1). <http://journalppw.com>
- Iwuka, O. ., & Henry, A. J. E. (2017). Effect of ICT on Secondary School Students ' Academic Performance in Christian Religious Studies in Oshimili North Local Government Area. *International Journal of Innovative Science, Engineering & Technology*, 4(5), 376–384.
- Jančič, P., & Hus, V. (2019). Representation of teaching strategies based on constructivism in social studies. In *Int. J. Innovation and Learning* (Vol. 25, Issue 1).
- Johanson, G. A., & Brooks, G. P. (2010). Initial scale development: Sample size for pilot studies. *Educational and Psychological Measurement*, 70(3), 394–400. <https://doi.org/10.1177/0013164409355692>
- Kallestrup, M. (2018). Learning effects of negotiation simulations: Evidence from different student cohorts. In *Simulations of decision-making as active learning tools* (pp. 165–182). Springer.

- Kassem, H. M. (2018). The Impact of Student-Centered Instruction on EFL Learners' Affect and Achievement. *English Language Teaching*, 12(1), 134. <https://doi.org/10.5539/elt.v12n1p134>
- Khayyer, Z., Saberi Azad, R., Torkzadeh Arani, Z., & Jafari Harandi, R. (2021). Examining the effect of stress induction on auditory working memory performance for emotional and non-emotional stimuli in female students. *Heliyon*, 7(4). <https://doi.org/10.1016/j.heliyon.2021.e06876>
- KICD. (2019). Report on 3rd national conference on curriculum reforms. In *National Conference on Curriculum Reforms*.
- Kim, J. S. (2005). The effects of a constructivist teaching approach on student academic achievement, self-concept, and learning strategies. *Asia Pacific Education Review*, 6(1), 7–19.
- KNEC. (2019). *2019 KCSE Christian Religious Education CRE (313) KNEC Report*.
- Koross, R. (2016). Micro Teaching an Efficient Technique for Learning Effective Teaching Skills: Pre-service Teachers' Perspective. *IRA International Journal of Education and Multidisciplinary Studies (ISSN 2455–2526)*, 4(2), 289. <https://doi.org/10.21013/irajems.v4.n2.p7>
- Kothari, C. R. (2001). *Research Methodology* New Delhi: Wishwa Prakashan. *New Delhi*.
- Kouam, F., & William, A. (2024). *International Journal of Research Publications*. February. <https://doi.org/10.47119/IJRP1001431220246120>
- Kumar Shah, R. (2019). Effective Constructivist Teaching Learning in the Classroom. *Shanlax International Journal of Education*, 7(4), 1–13. <https://doi.org/10.34293/education.v7i4.600>
- Lavi, R., Tal, M., & Dori, Y. J. (2021). Perceptions of STEM alumni and students on developing 21st century skills through methods of teaching and learning. *Studies in Educational Evaluation*, 70. <https://doi.org/10.1016/j.stueduc.2021.101002>
- Magfirah, I., Chairul, M., Umanailo, B., Malmia, W., Makatita, S. H., Lisaholit, S., Azwan, A., Tinggapi, H., & Chairul, M. (2019). Problem-Based Learning As An Effort To Improve Student Learning Outcomes. *Article in International Journal of Scientific & Technology Research*, 8(09). [www.ijstr.org](http://www.ijstr.org)
- Mahmud, I. (2013). Micro Teaching to Improve Teaching Method: An Analysis on Students' Perspectives. *IOSR Journal of Research & Method in Education (IOSRJRME)*, 1(4), 69–76. <https://doi.org/10.9790/7388-0146976>
- Makgato, M. (2012). Identifying constructivist methodologies and pedagogic content knowledge in the teaching and learning of technology. *Procedia - Social and Behavioral Sciences - Elsevier*, 47, 1398–1402.

<https://doi.org/10.1016/j.sbspro.2012.06.832>

- Mayende, G. B. (2022). Emerging Trends in the Performance of Christian Religious Education in the Kenya Certificate of Secondary Education Examination. *Journal of Advances in Education and Philosophy*, 6(2), 51–62. <https://doi.org/10.36348/jaep.2022.v06i02.002>
- Metto, E., & Ndiku Makewa, L. (2014). Learner-Centered Teaching: Can It Work in Kenyan Public Primary Schools? *American Journal of Educational Research*, 2(11A), 23–29. <https://doi.org/10.12691/education-2-11a-4>
- Milad, M. (2023). *The International Journal of Humanities Education Translating Constructivism into Pedagogy from Philosophy to Practice Active Project-Based Learning* (Vol. 19).
- Monteiro, S., & Sibbald, M. (2020). Aha! Taking on the myth that simulation-derived surprise enhances learning. *Medical Education*, 54(6), 510–516. <https://doi.org/10.1111/medu.14141>
- Mueke, S., Embeywa, P. H., & Mulwa, P. D. (2023). Assessment of difference in Self-Efficacy among Students taught using Eclectic Learning approach and those taught using Conventional Method in CRE in Machakos County. *International Journal of Innovation Scientific Research and Review*, 05(March), 4220–4224.
- Mugenda, O. M., & Mugenda, A. G. (2003). *Quantitative and qualitative approaches*. Nairobi: Acts Press.
- Murimi, E. K., Njeru, L. K., Gichimu, B. M., & Ndirangu, S. N. (2019). Effects of Urban Expansion on Agricultural Resources: A Case Study of Embu Town in Kenya. *Asian Journal of Agricultural Extension, Economics & Sociology*, April 2022, 1–11. <https://doi.org/10.9734/ajaees/2019/v33i430186>
- Murundu, H. H., Jesse, N. W., & Mboya, T. (2022). Factors influencing Media Integration in teaching and learning of Christian Religious Education. *International Journal of Science Academic Research*, 03(09), 4402–4408.
- Musengimana, J., Kampire, E., & Ntawiha, P. (2022). Rwandan secondary school students' attitudes in learning chemistry: explored with task-based instruction. *Heliyon*, 8(9). <https://doi.org/10.1016/j.heliyon.2022.e10509>
- Mwanda, G., Odundo, P., & Midigo, R. (2017). Application of Constructivist Instructional Approach in Kenya ; Focus on Learner Achievement in Different Class Categories. *Imperial Journal of Interdisciplinary Research (IJIR)*, 3(10,2017).
- Mwanje, J. I. (2001). Issues in social science research, social science research methodology series module 1. *Organisation for Social Science Research in East and Southern Africa*.

- Nawose, I. D., Musamas, J., & Kerich, M. (2023). Assessment Strategies Adopted by Christian Religious Education teachers in Assessment of Learner Value Acquisition in Secondary Schools in Kenya. *The Educator: A Journal of the School of Education, Moi University*, 3(1). <https://journals.mu.ac.ke/index.php/edj/>
- Ndwiga & Odundo. (2020). *Appropriateness Of Explicit Teaching Methods On Learners ' Achievement In Kiswahili Composition Writing*. 1997, 1–9.
- Ndwiga, Z. N., Odundo, P. A., & Mbuthia, E. M. (2020). Appropriateness of explicit teaching methods on learners' achievement in Kiswahili composition writing. *J. Env. Sust. Adv. Res*, 6, 1–9.
- Neveu, M. J. (2009). Educating the Reflexive Practitioner. *Enquiry The ARCC Journal for Architectural Research*, 6(1), 1–8. <https://doi.org/10.17831/enq:arcc.v6i1.5>
- Newman, S., & Latifi, A. (2021). Vygotsky, education, and teacher education. *Journal of Education for Teaching*, 47(1), 4–17. <https://doi.org/10.1080/02607476.2020.1831375>
- Nguyen, H. T. L., & Austin, G. (2018). On Invoking Third Parties in Vietnamese Medical Communication. *Theory and Practice in Language Studies*, 8(7), 713. <https://doi.org/10.17507/tpls.0807.01>
- Njagi, N. Z. (2016). *Effects of pedagogical methodologies on learners' achievement in Kiswahili composition in secondary schools in Garissa County, Kenya*. University of Nairobi.
- Nwafor, O. M. (2007). Educational innovation: Process and products. *Onitsha, Nigeria: Perfect Image*.
- Nyakito, C. (2018). *Baraton Interdisciplinary Research Journal (2018)*, 8(Special Issue), pp 1-10. 8, 1–10.
- Nyeko, J. P. T., Pence, A., & Barnes, G. E. (2015). Home Environment Factors and Ecd Exposure Predict School Entry and Grade Progression: a Study From a Peri-Urban Community in Central Uganda, Africa. *International Journal of Child, Youth and Family Studies*, 6(4–1), 662–679. <https://doi.org/10.18357/ijcyfs.641201515051>
- Nzomo, C., Rugano, P., Njoroge Mungai, J., & Gitonga Muriithi, C. (2023). Inquiry-based learning and students' self-efficacy in Chemistry among secondary schools in Kenya. *Heliyon*, 9(1). <https://doi.org/10.1016/j.heliyon.2022.e12672>
- O'Regan, S., Molloy, E., Watterson, L., & Nestel, D. (2016). Observer roles that optimise learning in healthcare simulation education: a systematic review. *Advances in Simulation*, 1(1). <https://doi.org/10.1186/s41077-015-0004-8>

- Obiekwe, C. L. (2008). Effects of constructivist instructional approach on students' achievement and interest in basic ecological concepts in biology. In *Unpublished M. ED thesis, Department of Science Education, University of Nigeria, Nsukka*.
- Odundo, P. A., & Gunga, S. O. (2013). Effects of Application of Instructional Methods on Learner Achievement in Business Studies in Secondary Schools in Kenya. *International Journal of Education and Research*, 1(5), 1–22.
- of Kenya, R. (2018). *Republic of Kenya Ministry of Education, Science and Technology Volume One: 1–251*.
- Ogbonna, C. (2016). *Effects of Two Constructivist Instructional Models on Students' Achievement and Retention in Number and Numeration*.
- Ogheneakoke, C. E., Obro, S., & Benike, J. (2019). In Search of a More Effective Strategy: Using Simulation Games Instructional Strategy for the Teaching and Learning of Social Studies in Secondary School. *Journal of International Social Studies*, 9, 53–71. <http://www.iajiss.org><http://www.iajiss.org>
- Okeke, C. (2015). *Effects of Constructive Simulation teaching strategy on students' achievement and retention in Christian Religious Studies* (Issue Mc). University of Nigeria, Nsukka.
- Ololube, N. P., & Kpolovie, P. J. (2012). *Approaches to Conducting Scientific Research in Education , Arts and the Social Sciences. June*.
- Othoo, H. A., & Aseu, O. G. (2022). Role of Christian Religious Education in the Moral Values Formation of Secondary School Students in Teso South Sub - County , Busia County , Kenya. *Journal of Research Innovation and Implication in Education*, 6(2), 307.317.
- Otieno, W. A. P. (2021). Effectiveness Teacher-Centered Method of Teaching Christian Religious Education in Instilling Respect Among Students in Public Secondary Schools in Rachuonyo North Sub-County, Kenya. *African Journal of Education and Practice*, 7(1), 41. <https://doi.org/10.47604/ajep.1209>
- Palak, D., & Walls, R. T. (2009). Teachers' beliefs and technology practices: A mixed-methods approach. *Journal of Research on Technology in Education*, 41(4), 417–441. <https://doi.org/10.1080/15391523.2009.10782537>
- Pande, M., & Bharathi, S. V. (2020). Theoretical foundations of design thinking – A constructivism learning approach to design thinking. *Thinking Skills and Creativity*, 36. <https://doi.org/10.1016/j.tsc.2020.100637>
- Rahman. (2014). Professional Competence , Pedagogical Competence and the Performance of Junior High School of Science Teachers. *Online*, 5(9), 75–80. [www.iiste.org](http://www.iiste.org)

- Ramnarain, U., & Ramaila, S. (2018). The relationship between chemistry self-efficacy of South African first year university students and their academic performance. *Chemistry Education Research and Practice*, 19(1), 60–67.
- Reich, K. (2007). Interactive Constructivism in Education Author ( s ): Kersten Reich  
Published by : Purdue University Press Stable URL :  
<https://www.jstor.org/stable/42922599> Interactive Constructivism in Education.  
*Education and Culture*, 23(1), 7–26.
- Restivo, M., Shandra, J. M., & Sommer, J. M. (2018). The United States Agency for International Development and forest loss: A cross-national analysis of environmental aid. *Social Science Journal*, 55(2), 171–181.  
<https://doi.org/10.1016/j.soscij.2017.09.001>
- Sagala, R., Umam, R., Thahir, A., Saregar, A., & Wardani, I. (2019). The effectiveness of stem-based on gender differences: The impact of physics concept understanding. *European Journal of Educational Research*, 8(3), 753–761. <https://doi.org/10.12973/eu-jer.8.3.753>
- Saoke, V. O., Musafiri, C. M., Ndwiga, Z. N., & Githaiga, P. W. (2023). The christian religious education teachers’ attitudes toward the five-stage lesson plan framework in Kenya: A gender-based analysis. *Heliyon*, 9(8).  
<https://doi.org/10.1016/j.heliyon.2023.e19104>
- Saoke, V. O., Ndwiga, Z. N., Githaiga, P. W., & Musafiri, C. M. (2022). Determinants of awareness and implementation of five-stage lesson plan framework among Christian Religious Education teachers in Meru County, Kenya. *Heliyon*, 8(11). <https://doi.org/10.1016/j.heliyon.2022.e11177>
- Saudelli, M. G., Kleiv, R., Davies, J., Jungmark, M., & Mueller, R. (2021). PhET Simulations in Undergraduate Physics: Constructivist Learning Theory in Practice. In *52 Brock Education Journal* (Vol. 31, Issue 1).  
<https://journals.library.brocku.ca/brocked>
- Schmidt, M., & Allsup, R. E. (2019). John Dewey and Teacher Education. In *Oxford Research Encyclopedia of Education*. Oxford University Press.  
<https://doi.org/10.1093/acrefore/9780190264093.013.475>
- Shams, A. K., Arshad, M., & Ahmed, G. (2019). The Efficiency of Accelerated Learning and Facilitation of English Language Understanding: A Comparative and Analytical Study of the At Secondary Level. *Global Social Sciences Review*, IV(I), 248–254. [https://doi.org/10.31703/gssr.2019\(iv-i\).33](https://doi.org/10.31703/gssr.2019(iv-i).33)
- Sierra, J. (2020). The importance of simulation in teaching and learning economics: The students’ perspective. *Innovations in Education and Teaching International*, 57(5), 521–531. <https://doi.org/10.1080/14703297.2019.1647268>
- Simba, N. O., Agak, J. O., & Kabuka, E. K. (2016). *Impact of Discipline on Academic Performance of Pupils in Public Primary Schools in Muhoroni Sub-County* ,

Kenya. 7(6), 164–173.

Siswati, B. H., & Corebima, A. D. (2017). The Effect of Education Level and Gender on Students' Metacognitive Skills in Malang, Indonesia. *Advances in Social Sciences Research Journal*, 4(4). <https://doi.org/10.14738/assrj.44.2813>

Situma, J. (2016). Methods used by teachers to teach Christian religious education in secondary schools in Kimilili in Bungoma County, Kenya. *British Journal of Education*, 4(1), 1–8.

Smimou, K., & Dahl, D. W. (2012). On the Relationship Between Students' Perceptions of Teaching Quality, Methods of Assessment, and Satisfaction. *Journal of Education for Business*, 87(1), 22–35. <https://doi.org/10.1080/08832323.2010.550339>

Srikoon, S., Bunterm, T., Nethanomsak, T., & Tang, K. N. (2018). Effect of 5P model on academic achievement, creative thinking, and research characteristics. *Kasetsart Journal of Social Sciences*, 39(3), 488–495. <https://doi.org/10.1016/j.kjss.2018.06.011>

Supena, I., Darmuki, A., & Hariyadi, A. (2021). The influence of 4C (constructive, critical, creativity, collaborative) learning model on students' learning outcomes. *International Journal of Instruction*, 14(3), 873–892. <https://doi.org/10.29333/iji.2021.14351a>

Sutinen, A., & Mead, G. H. (2007). Constructivism and education : education as an interpretative transformational process. *Springer*, 1–14. <https://doi.org/10.1007/s11217-007-9043-5>

Taber, K. S. (2018). The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education. *Research in Science Education*, 48(6), 1273–1296. <https://doi.org/10.1007/s11165-016-9602-2>

The Ministry of Planning and Devolution. (2007). The Kenya Vision 2030. The Popular Version. In *Government of the Republic of Kenya*. [http://www.vision2030.go.ke/cms/vds/Popular\\_Version.pdf](http://www.vision2030.go.ke/cms/vds/Popular_Version.pdf)

Tong, D. H., Uyen, B. P., & Quoc, N. V. A. (2021). The improvement of 10th students' mathematical communication skills through learning ellipse topics. *Heliyon*, 7(11). <https://doi.org/10.1016/j.heliyon.2021.e08282>

Tsai, P. S., Chai, C. S., Hong, H. Y., & Koh, J. H. L. (2017). Students' conceptions of and approaches to knowledge building and its relationship to learning outcomes. *Interactive Learning Environments*, 25(6), 749–761. <https://doi.org/10.1080/10494820.2016.1178653>

UNESCO. (2019a). Right to education handbook. In *London, United Kingdom*.

UNESCO, E. international and. (2019b). *Global Framework of Professional*

*Teaching Standards.*

- Usherwood, S. (2014). Constructing effective simulations of the European Union for teaching: Realising the potential. *European Political Science*, 13, 53–60.
- Vasileva, O., & Balyasnikova, N. (2019). (Re)introducing vygotsky's thought: From historical overview to contemporary psychology. *Frontiers in Psychology*, 10(AUG). <https://doi.org/10.3389/fpsyg.2019.01515>
- Vitorino, R. W. S., Célia, ;, Fornaziero, C., & Fernandes, E. V. (2020). Evaluation of Performance and Perception of Learning in Teaching Human Anatomy: Traditional Method vs Constructivist Method. *Int. J. Morphol*, 38(1), 74–77.
- Vygotsky, L. S. (1978). *The role of play in development*.
- Vygotsky, L. S., & Cole, M. (1978). *Mind in society: Development of higher psychological processes*. Harvard university press.
- Wals, & Arjen EJ. (2012). *United Nations Decade of Education for Sustainable Development ( Shaping the Education of Tomorrow: 2012 Full-length Report on the UN Decade of Education for Sustainable Development DESD Monitoring & Evaluation-2012 UNESCO Education Sector*.
- Watts, L. (2019). Reflective Practice, Reflexivity, and Critical Reflection in Social Work Education in Australia. *Australian Social Work*, 72(1), 8–20. <https://doi.org/10.1080/0312407X.2018.1521856>
- Wells, C. S., & Wollack, J. A. (2003). An instructor's guide to understanding test reliability, testing and evaluation services. *Madison: University of Wisconsin*.
- White, H., & S. S. (2014). *Quasi-Experimental Design and Methods* (Issue 8).
- Winarsunu, T., Iswari Azizaha, B. S., Fasikha, S. S., & Anwar, Z. (2023). Life skills training: Can it increases self esteem and reduces student anxiety? *Heliyon*, 9(4). <https://doi.org/10.1016/j.heliyon.2023.e15232>
- Yang, R. (2022). An empirical study on the scaffolding Chinese university students' English argumentative writing based on toulmin model. *Heliyon*, 8(12). <https://doi.org/10.1016/j.heliyon.2022.e12199>
- Ye, Y., & Shih, Y. H. (2021). Development of John Dewey's educational philosophy and its implications for children's education. *Policy Futures in Education*, 19(7), 877–890. <https://doi.org/10.1177/1478210320987678>
- Yilmaz, K. (n.d.). Constructivist Suggestions Constructivism: Its Theoretical Underpinnings, Variations, and Implications for Classroom Instruction. *Educational Horizons*, 12.
- Yu, Z. (2021). The effects of gender, educational level, and personality on online learning outcomes during the COVID-19 pandemic. *International Journal of*

*Educational Technology in Higher Education*, 18(1).  
<https://doi.org/10.1186/s41239-021-00252-3>

Zain, S. F. H. S. (2018). Effect of Classroom Learning Environment on Students' Academic achievement in Mathematics at Secondary Level Effect of Classroom LE on Students' AA in Mathematics at Secondary Level 208. *Bulletin of Education and Research*, 40(2), 207–218.  
<https://files.eric.ed.gov/fulltext/EJ1209817.pdf>

## **APPENDICES**

### **Appendix I: Training Manual**

#### **General Objective:**

The main purpose of the workshop was to train the teacher in treatment group on the use of constructive simulation teaching method.

#### **Specific Objectives:**

It was expected that by the end of the workshop, the participant would be able to:

1. Explain the meaning of constructive teaching
2. Discuss the principles of constructive teaching
3. Discuss advantages and disadvantages of constructive teaching
4. Explain the meaning of simulation
5. Identify characteristics of simulation
6. Discuss advantages and disadvantages of simulation
7. Explain the concept of constructive simulation

**Appendix II: Learner Attainment Test in CRE (Pre - Test)**

**SCHOOL CODE** : [ ] (Anonymous code given by the researcher)

**LEARNER'S CODE:** [ ] (Anonymous code assigned by the researcher)

**TIME** : 50 MINUTES

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(This test was for the purpose of research and the marks awarded were for the stated purpose only. There were no implications for failing this test. The purpose of this test was to evaluate the knowledge the learner brought into the learning environment)

**INSTRUCTIONS:**

- Answer all the questions
- Do not write your name or that of your school on this test

**QUESTIONS: 40 marks**

1. Who announced the birth of Jesus and John the Baptist (1 mark)
2. Which king ruled Israel during the birth of Jesus (1 mark)
3. Jesus was born by a ..... girl called .....(2 marks)
4. Jesus was born in a ..... in the town of .....(2 marks)
5. What is the name of the song sung by the mother of Jesus when she visited Elizabeth? (1 mark)
6. The father of John the Baptist was known as ..... (1 mark)
7. When John the Baptist was born, his father burst into a song known as ..... (1 mark)
8. Why did Jesus accept to be baptized yet he was the Son of God? (1 mark)
9. How old was Jesus when his parents took him to the temple? (1 mark)
10. Jesus stayed in the wilderness for ..... days and nights before being tempted by Satan (1 mark)
11. How old was Jesus when he began preaching (1 mark)
12. Jesus was tempted ..... times (1 mark)
13. Describe the temptations of Jesus (6 marks)
14. Who is a disciple? (1 mark)
15. Who were the first three disciples to be called by Jesus (3 marks)
16. Highlight the 12 disciples of Jesus (12marks)
17. What do the 12 disciples chosen by Jesus represent? (1 mark)
18. Which qualities does a true disciple of Jesus portray? (3 mark)

**Appendix III: Learner Attainment Test in CRE (POST - TEST)**

**SCHOOL CODE** : [ ] (Anonymous code given by the researcher)

**STUDENT CODE** : [ ] (Anonymous code assigned to you by the researcher)

**TIME** : 1 HOUR

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(This test was for research and the marks awarded were for the stated purpose only. There were no implications for failing this test. The purpose of this test, therefore, was to evaluate the knowledge learners acquired over the duration of the study)

**INSTRUCTIONS:**

- Answer all the questions
- Do not write your name or that of your school on this test

**QUESTIONS: 50 marks**

1. What did Jesus do before choosing the 12 disciples? (1 mark)
2. Highlight the qualities of John the Baptist as described by Angel Gabriel (3 marks)
3. What was the significance of the calling of the 12 disciples of Jesus (2 marks)
4. Why was Jesus rejected at Nazareth (2 marks)
5. What lessons do Christians learn from the call of the first disciples (3 marks)
6. Why was the birth of Jesus extraordinary (2 marks)
7. Highlight the similarities between the birth of Jesus and John the Baptist (3 marks)
8. State the relevance of baptism to Christians today (2 marks)
9. Outline occasions when Jesus was tempted in St. Luke's gospel (2 marks)
10. Compare the life of Elijah and John the Baptist (3 marks)
11. Describe the relevance of the teachings of John the Baptist to Christians today (3 marks)
12. Explain how Christians can overcome temptations in the contemporary world (4 marks)

13. Narrate the teaching of Jesus in the sermon on the plain (8 marks)

14. The Sermon on the Plain cloze test (12 marks)

## The Sermon on the Plain

Complete the paragraph by filling in the blanks with the correct words from the word bank at the bottom of the story.



Looking at his disciples, he said:

"Blessed are you who are \_\_\_\_\_,  
for yours is the \_\_\_\_\_ of God.

Blessed are you who \_\_\_\_\_ now,  
for you will be \_\_\_\_\_.

Blessed are you who \_\_\_\_\_ now,  
for you will \_\_\_\_\_.

Blessed are you when men \_\_\_\_\_ you,  
when they exclude you and insult you  
and reject your name as evil, because of the Son of Man.

"Rejoice in that day and leap for \_\_\_\_\_, because \_\_\_\_\_ is  
your \_\_\_\_\_ in \_\_\_\_\_. For that is how their fathers treated the  
\_\_\_\_\_.

Luke 6:20-23 (NIV)

great	hunger	laugh	reward
hate	joy	poor	satisfied
heaven	kingdom	prophets	weep



Questions	Response (please circle your response)				
I enjoyed the lessons when constructive simulation was used in teaching	5	4	3	2	1
I found the teacher more interesting when she used constructive simulation than the method of teaching that she has been using	5	4	3	2	1
CRE lessons are easily understood using constructive simulation	5	4	3	2	1
Constructive Simulation enables me retain/remember what was taught	5	4	3	2	1
I feel that constructive simulation has more effect on my outcome than the teaching method that the teacher uses	5	4	3	2	1
I would recommend constructive simulation as an alternative teaching method in CRE	5	4	3	2	1
I would feel more confident if teachers adopted learner centred methods that involve me more when teaching CRE	5	4	3	2	1

*Thank you for your cooperation*

## **Appendix V: Student Questionnaire (Conventional method)**

### **Instructions**

This questionnaire is for the purpose of research only. Confidentiality of the information obtained will be guaranteed throughout the study and will be reported as general interpretation. Your feedback will not be associated with you or your school; therefore, do not write your name or that of your school in the questionnaire. Please complete each section as instructed.

### **PART A: Demographic Information**

*Please tick your chosen response in the box  where applicable.*

1. Gender  Male  Female

2. Age  Below 14 years  14 – 15 years

16 – 17 years  Above 17 years

### **PART B: Conceptions of the Conventional method and learning outcome in CRE**

The statements below represent varying feeling towards the methods used in teaching CRE. Please read each statement and indicate, on a scale of 1-5, the extent to which you agree or disagree with it by ticking where applicable.

*Where:* 5 - Strongly Agree

2 - Disagree

4 - Agree

1 - Strongly Disagree

3 - Undecided

<b>Questions</b>	<b>Response (please circle your response)</b>				
I enjoy CRE lessons with the method my teacher used in teaching	5	4	3	2	1
I find the teacher interesting when he/she uses his/her method of teaching	5	4	3	2	1
CRE lessons are easily understood using my teacher's method of teaching	5	4	3	2	1
The method my teacher uses to teach enables me to retain/ remember what is taught	5	4	3	2	1
The method a teacher uses in teaching influences my learning outcome in CRE	5	4	3	2	1
The teaching method my teacher uses enables me to participate in learning	5	4	3	2	1
I would feel more confident if teachers adopted learner centred methods which involve me more when teaching CRE	5	4	3	2	1

*Thank you for your cooperation*

## Appendix VI: Lesson Observation Schedule

Subject: .....

Form: .....

Time : .....

Date: .....

1. Availability of lesson plan

*Adequate:*

*Not available:*

Adequacy of objectives

*Available:*

*Inadequate:*

2. Availability of lesson notes

*Available:*

*Not available:*

3. The researcher, in scoring tables on lesson development, lesson presentation, learner participation, learning resources, evaluation of learning resources, and lesson evaluation, used the following criteria on a scale of 1-5 as indicated in the score column.

Where; 5 - Very Good, 4 – Good, 3 – Satisfactory, 2 – Average, 1 - Below Average

**a) Lesson Development**

Criteria	Score				
	5	4	3	2	1
Introduction					
Content organization					
Conclusion/ Summary					

**b) Lesson Presentation**

Criteria	Score				
	5	4	3	2	1
Mastery of content					
Lesson coverage in line with the syllabus					
Accuracy of content					
Adherence to the teaching method					

**c) Learner Participation**

Criteria	Score				
	5	4	3	2	1
Method brings forth active learner participation					
Ability to do given tasks					
Ability to make short notes					

**d) Learning Resources**

Criteria	Score				
	5	4	3	2	1
Visual materials ( <i>objects, models, specimen, printed materials, boards, non-projected materials, projected materials &amp; graphics</i> )					
Audio materials ( <i>radio, record players, tape recorders</i> )					
Audio visual materials ( <i>motion pictures, television</i> )					
Community resources ( <i>places, people, things, and activities</i> )					

**e) Evaluation of Learning Resources**

Criteria	Score				
	5	4	3	2	1
Adequacy of available learning resources					
Relevance of available learning resources					

**f) Lesson Evaluation**

Criteria	Score				
	5	4	3	2	1
Monitoring learner understanding					
Catering for all types of learners					
Guiding on doing given tasks					
Relevance of the given assignment					

## **Appendix VII: Research Authorization**

## **Appendix VIII: Research Permit**