

**JOURNALISTIC NARRATIVE PRACTICES USED IN THE MEDIATION OF  
SCIENTIFIC AND TECHNOLOGICAL KNOWLEDGE FOR NEWSPAPER  
AUDIENCES**

**BY**

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**2025**

## DECLARATION

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**DEDICATION**

I dedicate this thesis to my mother, JEMIMAH NYABOKE, in whom I find a fountain of love.

## ACKNOWLEDGEMENT

This thesis is a product of diverse forms of support and contribution without which its fruition would not have been realised. I therefore wish to extend my sincere acknowledgement to all those, in one way or another, supported me during the painstaking process of conducting this study to the production and submission of this thesis for examination. Foremost, I would like to most profoundly thank my supervisors Professor Daniel Rotich and Dr. Nguri Matu for their time, availability and incessant guidance during the tenure of this study. Their reliable patience, understanding and guidance were a great inspiration towards the completion of this study. May the Lord richly reward them for this invaluable support!

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## ABSTRACT

Use of narrative journalism techniques to communicate science and technology to non-expert audiences remains understudied in global context. In Kenya, science and technology as a beat together with non-expert audiences on matters science and technology communication, comparatively remain underexplored. The current study sought to address this gap. The aim of the study, therefore, was to examine the extent to which journalists utilize narrative techniques in newspaper news stories to communicate science and technology information to non-expert audiences. The study was anchored on the functionalism and structuralism approaches to the study of narratives. The study sought to test three hypotheses: There is no significant association between the journalists' use of scene construction techniques in news stories and the communication of scientific and technological information to non-expert audiences; there is no significant relationship between the journalists' use of viewpoint techniques in news stories and the communication of scientific and technological information to non-expert audiences; there are no significant differences between the journalists' events scheduling techniques and the communication of scientific and technological information to non-expert audiences. The study adopted a mixed method research and an exploratory sequential design. The study included all the 64 journalists, from the North Rift region drawn from four leading media houses namely: *The Daily Nation*, *The Standard*, *The Star* and *The People Daily*. Questionnaire with structured questions was used to collect quantitative data. Qualitative data comprised of copies of news stories on science and technology published by the four newspapers in 2019. Data was analyzed through inferential statistics, corroborated with direct content analysis of the published stories. Chi Square Test of independent samples and T-test for Independent Samples were used to analyze quantitative data. Direct content analysis of the stories based on the codes derived from the narrative theory revealed that journalists employed scene construction, viewpoint and event scheduling techniques to communicate scientific and technological information to non-expert audiences. Inferential statistical analysis of quantitative data established that there was a statistically significant relationship between the journalists' use of scene construction techniques and their communication of scientific and technological information ( $\chi^2 (1) = 8.195, p=0.004$ ). There was also statistically significant association between journalists' use of viewpoint techniques and communication of scientific and technological information ( $\chi^2 (1) = 6.668, p=0.010$ ). However, there were no significant differences between event scheduling techniques and communication of scientific and technological information to non-expert audiences ( $t (126) = 0.333, p=0.739$ ). The study concludes that journalistic narrative techniques are utilized in newspaper news stories by journalists to communicate scientific and technological information to non-expert audiences. The study will be beneficial to the media houses whose journalists comprise the study sample; practicing journalists who specialize in science and technology, other researchers interested in science communication, and the entire Kenyan media industry. The study recommends the need for media houses to dedicate specific journalists to particular beats and train them on the use of literary journalistic techniques. The Media Council of Kenya needs to include literary journalism in its list of refresher courses for practicing journalists.

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**LIST OF ABBREVIATIONS AND ACRONYMS**

<b>UK:</b>	United Kingdom
<b>MI:</b>	Mental Illnesses
<b>ICT:</b>	Information Communication Technology
<b>CNSM:</b>	Communicated Narrative Sense-making Theory
<b>TVETA:</b>	Technical and Vocational Education and Training Authority
<b>MTRH:</b>	Moi Teaching and Referral Hospital
<b>CEO:</b>	Chief Executive Officer
<b>RVTI:</b>	Rift Valley Technical Training Institute
<b>KNMWT:</b>	Kenya National Museum, West Turkana
<b>NACOSTI:</b>	National Commission for Science Technology and Innovation
<b>SPSS:</b>	Statistical Packages for Social Sciences
<b>QUAL:</b>	Qualitative Analysis
<b>QUANT:</b>	Quantitative Analysis
<b>ANOVA:</b>	Analysis of Variance

## DEFINITION OF OPERATIONAL TERMS

**Narrative Techniques:** Literary or fiction elements of style used by journalists in news stories to communicate to their audiences, for example in this study, use of viewpoint, event scheduling, and scene construction, collectively referred to as journalistic narrative techniques.

**News narratives:** In the context of this study news narratives refer to news stories published in newspapers and analyzed in this study. Copies of such stories are in the appendix section of this thesis

**Viewpoint Techniques:** Journalistic narrative techniques in which news events are communicated through the perceptual character(s) in a newspaper news story. These techniques constitute one of the independent variables in this study

**Event structuring techniques:** In the context of this study, journalistic narrative techniques constitute a style in which story events are arranged and rendered as they unfold enable readers experience the events in the story in real time or as they happen.

**Scene Construction techniques:** For purposes of this study, this is a style in which a journalist superimposes the settings in which a story occurs and builds them as a collection of several meaningful units.

**Scientific and technological information:** In this study, this refers information touching on aspects such as scientific discoveries, innovations, medical breakthroughs that together operationalize the variable science and technology information.

**Non-expert audiences:** A mass media audience, in this study newspaper audience, without specialized skills on matters science and technology. In this study, such audience is also described as lay audience

## **CHAPTER ONE**

### **INTRODUCTION**

#### **1.0 Overview**

The first chapter of the current study explores the utilization of journalistic narrative techniques by newspaper reporters to communicate scientific and technological information to non-expert audiences. The chapter discusses the study from the global perspective narrowing down to the regional and, finally, to the Kenyan and local situations. The chapter highlights the study's background, statement of the problem, research questions and study scope. Also discussed in the chapter is the rationale for the study. The chapter closes with a summary.

#### **1.1 Background to the Study**

Traditionally, scientific and technological information was communicated in a more linear manner; that is, from the experts to the non-experts. The non-experts were considered as lacking in understanding of such information hence the need for communicators to break it down for them. With time, communication of scientific and technological information has evolved into a dialogic (two-way) communication activity to enhance a common understanding of science and technology information. Consequently, communication of scientific and technological information to the public, and in particular to non-experts, has become an increasingly important part of our lives and a subject of science communication research (Brossard and Scheufele, 2013; Garvey, 2014). The communication of scientific and technological information has since subsumed narration largely due to the suitability of narration in rendering

such information. The power and influence of narration in communication has been recognized and utilized for thousands of years (Fisher, 1987).

The genesis of communication on the basis of narrative techniques and narrative language has been a dominant motif in the development of the human race, which consequently, controlled the genesis of human mental processing of information, development of societies and human culture (Dautenhahn, 2001). According to Dautenhahn (2001), the use of narrative language has significantly formed the foundation of human socialization that has preserved societal unity. Besides, all human cultures are ideally 'narrative' in their orientation thus offering an avenue through which young people are socialized to both develop into a skillful story-teller and communicator, and also into an autobiographical self. Narration therefore has been part of human life; the gap lies in the type of information told through narration, the techniques used, the subject matter of narration, and the nature of the audience targeted for information. Consequently, narration as a mode of communication has been described as the structuring of interrelated events and characters with a definite structure, confined to a context of space and time, communicating specific content on a topic or subject (Kreuter, *et al*, 2007). This definition separates narration from storytelling, and views narration as a text with a structure and function.

Narration later developed into a multidisciplinary subject and an escalation of the interpretivist approaches within the realm of social sciences. In particular, narration became a quantitative and qualitative endeavour in terms of the examination of the attendant content in narratives (Mitchell and Egudo, 2003). Surveys, questionnaires and quantitative analyses of behaviour themselves were found to be inadequate to

subsume the complexity of meaning contained in the narratives. Qualitative aspects thus became paramount in understanding narration and narrative techniques.

Previously, scientific and technological knowledge was relayed as fragmented information with very little regard audience, more so non-expert audience. This creates a situation the audience, particularly the non-expert one, is unable to draw inferences and generally make meaning out of such information (Downs 2014). This, therefore, suggests that there is need to consider ways and techniques for communicating scientific and technological information to non-expert audiences (Gough, Olive & Thomas 2012). Journalists in particular have a central role to play in communicating scientific and technological information to non-expert audiences since the media outlets such as newspapers, radio and television reach wide and diverse audiences irrespective of their location and demographics.

Media content, especially news, are now rich in narration. Entertainment ventures in television, to be specific, entails the use of narrative styles in the form of feature films and series. Information programs like news and documentaries are currently presented as narratives (Hickethier, 2002; Luginbühl, Schwab, & Burger, 2004). In equal measure, newspapers, magazines and the radio make extensive use of narration (Bell, 1999). Besides, the traditional media for narratives are, of course, books. This illustrates the permeation of narration and narrative techniques in the mass media and mass communication.

Narratives exist in a variety of types and formats and therefore can be used in different ways. They can be used in a variety of media such as video, photography or graphics, illustrations, normally described by scholars as visual narration (Lambert 2013). Alternatively, one, especially journalists, can use them digitally, to share

stories with multiple and diverse audiences. In addition, narration can be used in traditional formats as well, for example in theatre arts or renditions. Whether in traditional or modern forms, narratives and narrative techniques can be utilized to communicate scientific and technological information with non-expert audiences.

Many researchers have studied how science and technology is often miscommunicated and misrepresented in the media by creating biased and subjective images of scientists, which in hinders and limits the public's understandings of the nature of science and technology (Brossard and Scheufele, 2013). Such researchers have advocated the use of narration to communicate scientific information especially to non-expert audiences. Turney (2001), for instance, notes that every successful non-fiction writer will tell you that the best way to interest and engage the general reader is to narrate, and that narration as a text, involves struggles, conflicts or adventures, heroes and villains, complication and resolution. This makes narration suitable for communicating scientific non-fiction information. It also makes narration text for analysis and an area of research in science communication.

Science communication experts have delved into the disparities between expert and lay opinion since 1970 (Kahan, 2014) with the latest efforts devoted to the subject around pertinent issues such as climate change (Jones, 2014), energy from nuclear sources (Stoutenborough *et al.*, 2013), and acceptance and use of vaccines (Song, 2014), just to name but a few.

Scholars after the era of structuralism such as Michel Foucault (1970); Deleuze and Guattari (1980) have explored the centrality of narration as the unit of analysis of human knowledge and action and a vehicle of establishing and arriving at one's sense of self. Psychologists such as Bruner (2004) advocate for self-making narrative as a

treatise by arguing that there is no, whether instinctively or based on intuition, self to know; one that just exists there, ready to be expressed using words. Instead, according to the psychologist, we always construe and establish ourselves through narratives. The narratives we construct on ourselves and about ourselves do establish the sense of ourselves and help to redefine one's sense of self (Richardson and Adams, 2005) especially through communication and specifically communication of expert knowledge to non-expert audiences. Butler (2005) posits that when the 'I' devotes to giving a rendition about himself or herself, it normally begins with himself or herself, but as the story unfolds, this self is become immersed in a social context that goes beyond the self-capacities for narration. Thus, the writer observes that the 'I' no longer owns the story; but thus the story becomes a correlation or a product of relations to a set of events and content relations in a specific subject. This way, the expert can effectively communicate a specialized subject to the non-expert.

The post-structuralism tradition paved way for the narrative theory. The narrative theory is an offshoot of many fields of specialization, notably in the humanities. The centrality of the narrative as a basis of understanding, meaning making, and a vehicle in communication is ideally one among the many reasons behind the prominence in and spread of the narrative to a number of fields, such as the social sciences (Gittipong 2012). According to Gittipong, extremist groups, cults, religions, cultural, and other powerful trans-historical and trans-cultural organizations have always used narratives to reinforce certain ideologies and pursue certain courses of action. Communication of scientific and technological information to non-expert audiences can also be understood within a narrative framework. Narrative theory, and applied narrative research in fields such as psychology, organization science, neurobiology, communications, and political science all appreciate narratives in their potential to pot

subsume scientific and technological information, which can be relayed to the non-expert audiences by communication specialists.

In the area of cancer communication, researchers have suggested the use of narrative engagement (narratives that engage the audience in the events of the story) and transportation (narratives that use transportation as a technique) will be of much significance since they have the potential to overcome resistance, initiate and sustain cognition of new and complex information, generate cognitive and emotional reactions which all in turn generate ideal attitudes and intentions which are critical to social relations and the development of role models for behaviour change in situations of behavior change communication (Green, 2006; Kreuter *et al.* 2007).

In addition, in recent years, researchers have found out that narratives and storytelling are all effective in particular to the marginalized populations and racial or ethnic groups where narration is a rich source of information in particular subjects (Houston *et al.*, 2011; Larkey & Hecht, 2010; Unger, Cabassa, Molina, Contreras, & Baron, 2012). This shows how the narrative as a mode of communication has permeated irrespective of culture or racial boundaries. Narration is currently being used as a mode of communicating information in other disciplines notably science education, behavior change, political communication and a variety of strategic communication ventures.

In Britain for instance, narrative strategy and the genesis of strategic communication is viewed seen as a product of a challenged state grappling issues related to transnationalism (King 2010); a means of appealing coherently and succinctly to the benefits of participation in collective security whilst avoiding threatening the viability of collective security membership by acknowledging its costs. According to King, this

transnational dimension is being catalyzed by competition among states over the substance and content dimensions of British strategy in Helmand, which can be attributed to the critical analysis of the prevailing policy narratives on Afghanistan operationalized as stabilization, counter-narcotics, and counter-terrorism, in that order of priority. Competition within the state, as a consequence therefore, be conceptualized as an offshoot of the existing relationship between states based on political responsibility and military relations referred to by Edmunds (2010) as the 'renationalization' of defense policy. Transnational issues have guided UK policy in Afghanistan, specifically the sustenance of NATO as a common security tool and of the close affinity with the United States, through which Britain procures and maintains and perpetuates its national interest.

Kreuter *et al* (2007) have studied ways in which narrative can effectively be used in health communication campaigns. The writers found out that through identification narrative communication can be very useful mode for campaigning for or against certain social norms in a societal context. Identification as concept can mean a variety of things in different contexts: the viewer's perceived association to (Slater & Rouner, 2002); affinity (Basil, 1996); imitation to (Eyal & Rubin, 2003); or being media friends with certain character in media genres (Murphy, Frank, Moran & Patnoe-Woodley, 2011); cognitive processes in which information or events are perceived from another person's point of view (Cohen, 2006), and associating with a character (Wilkin *et al.*, 2007). This way, identification mediates the effects of narrative communication in context. For example, those who are more likely to identify themselves with a character are more likely to be affected by that character's speech and mannerisms (Banerjee & Greene, 2012; de Graaf, Hoeken, Sanders, & Beentjes, 2011; Igartua & Barrios, 2012; McQueen, Kreuter, Kalesan & Alcaraz, 2011; Murphy

*et al.*, 2011). Kreuter and his colleagues however did not discuss the mediating role that journalists play in narrative communication through the choice of narrative techniques, and the communication of scientific and technological information to non-expert audiences, an aspect that the current study sought to address.

Another concept related to identification and influence in the context of narrative communication is social identity theory. According to the social identity theory reference groups affect an individual who seeks to associate himself or herself with a reference group (Murphy *et al.*, 2011). In this connection, narratives have the gravitational pull to enable people identify themselves with certain reference groups which thus make them appropriate for communication of scientific and technological information to non-expert audiences. Identification also closely associated with exposure to human relationships based on constructs that moderate the efficacy of narrative communication. Notably, identification with characters can result to high levels of engagement with a story plot (Murphy *et al.*, 2011). Based on the concept of transportation (Green & Brock, 2000), it is likely that narratives can overcome resistance to messages being shared in a given context (Green & Brock, 2000; Kreuter *et al.*, 2007; Slater & Rouner, 2002), on the strength that audience's cognitive ability is transported and reinforced into to the thread of the story.

Muwanga-Zake (2010) details the obstacles encountered in using narratives in cross-cultural research, based on the previous research undertaking in Africa citing the introduction of Information and Communications Technology (ICT) in Bantu communities as a case. According to the writer, research in Africa must take into account native cultures if the African narratives are to be contextualized and understood. As an example, the writer fronts a proposal for Afro-centric research

paradigms, which among Bantu should consider Bunted. *Ubuntu* as an Afro-centric research paradigm can be infused with some Western paradigms to build on the authenticity as well as validity of data, and build on the usefulness of narrative research in Bantu communities. This study focuses on use of narratives in cross-cultural research backgrounds. Muwanga-Zake's research subsumes a communication aspect, that is, how to communicate research findings on narrative communication in cross-cultural backgrounds. However, the study does not refer to the communication of scientific and technological information to non-expert audiences. The study is, however, a useful framework on narration in cross-cultural African set-up using the introduction of ICT in Bantu communities as a case.

Clandinin, Pushor and Orr (2007) provide another example of research on narration in an African set-up. The writers posit that narrative research is just beyond the rendition of stories and narratives; they provide a framework of tools for developing, living out and representing communication inquiries. The writers argue that essentially most Indigenous African narratives are rendered in an oral form and in this connection, researchers need to fully appreciate the status of the source of narrative information, his or her stake in the whole scheme and the various dimensions of the narrative information given. This study, however, does not refer to communication of scientific information but talks about traditional information expressed in oral form. Whereas the current study may use narration just like Clandinin, Pushor and Orr (2007), the focus will be on how such narration is used to relay scientific information to non-expert audience. Narration techniques as a mode of communication are uniquely capable of making available scientific information to non-expert audiences in a manner that the audience can understand and relate with.

There are several studies that see narration more innovatively towards influencing knowledge, attitudes and behavior (Kreuter, Green, Cappella, Slater, Wise, Storey, Woolley, 2007), research that examines narration and dissemination of scientific information by journalists on non-expert audiences has not been fully explored. The current study is built on this gap on the basis that narration, due to its suitability to enhance the identification with characters, is better placed to disseminate scientific information to non-expert audiences through the mediation of journalists.

In the Kenyan situation, Taeko (2014) has studied the complex nature of literacy in Kenya; considering a narrative analysis of Maasai women's experiences. The study delves into the parochial notions of literacy and thus advances a case for the appreciation of Maasai women's self-determination learning in order to enhance human development in Kenya. The study endeavours to create a wider picture and understanding of the concept of literacy, based on the postcolonial feminist theory as a basis of ensuring that a woman's voice is appreciated. Through an in-depth analysis of narratives from three Maasai women, the study establishes that the so called 'illiterate' women possess their own literacy which enables them to understand their own situations and context (their community); and that these women rely on their self-determined literacy to initiate critical understanding of community issues; the women thus transform themselves into what the study describes as 'organic intellectuals,' having the potential to conceptualize information and knowledge required to address and confront community challenges by themselves. This study concludes that literacy programmes need to revolve around women from grassroots and any such literacy programme must take into account community traditions and culture.

Pfeiffer (2018) explores the interconnections between violence, morality, and place so as to empirically contextualize the motifs around moral violence. Using narratives selected through ethnographic research from an set up in Kenya, the study appreciates that when people provide moral sentiments about a locality, they are initiating (and sometimes sustaining) the causes of and personal anxieties about the prevailing nature of violence and inequalities that are attendant in the people's lives as urban residents. More emphasis is placed on the manner in which narratives on political and ethnic violence and HIV/AIDS have been combined to perpetuate moral violence as a chronic and more so a historically systemic variant form of structural violence. This study examines how narratives as a communication mode are used to sustain and perpetuate moral violence among certain cultural groups. The study does not discuss how journalistic narrative techniques are used in newspaper news stories to communicate scientific and technological information to non-expert audiences. This is what the current study sought to address.

## **1.2 Statement of the Problem**

Studies on narrative journalism techniques in science communication on a global perspective has focused on health, crime, politics, terrorism, among others. These studies have captured little on how journalists utilize narration techniques such as scene construction, event structuring and narrative viewpoint in newspaper news stories to communicate scientific information to non-expert audiences. Published research has observed that the sources from which non-experts receive science and technology information are rendered in narrative formats yet studies on how newspaper news journalists utilize narrative techniques to communicate scientific and technological information to non-expert audiences are scanty. Newspapers have been

cited by scholars as being ideal in communicating science and technology since they represent elaborate space on which to utilize journalistic narrative techniques unlike radio or television, which are all limited by amount of space and airtime devoted to news stories. Moreover, published information has cited newspaper as a primary source of news regarding science and technology issues since it has the luxury of space to utilize journalistic narrative techniques to communicate science and technology to non-expert audiences. Expert audiences get their information through specialized sources such as journals, specialized magazines and books. Science and technology communication, just like other kinds of communication, is socially inclusive irrespective of whether the audience is non-expert or expert. Given that science and technology has been understudied as a beat; and that the non-expert audiences are understudied on matters science and technology, and that, narrative journalism techniques have not been fully explored in news stories on science and technology, the current study sought to investigate the extent to which narrative journalism techniques are employed by journalists in newspaper news stories to communicate science and technology information to non-expert audiences.

### **1.3 Research Hypotheses**

The study sought to test the following research hypotheses:

H01: There is no significant association between the journalists' use of scene construction techniques in newspaper news stories and the communication of scientific and technological information to non-expert audiences.

H02: There is no significant relationship between the journalists' use of viewpoint techniques in newspaper news stories and the communication of scientific and technological information to non-expert audiences.

H03: There are no significant differences between the journalists' use of events scheduling techniques and the communication of scientific and technological information to non-expert audiences.

#### **1.4 Alternate Hypotheses**

The study was based on the following alternate research hypotheses:

HA1: There is significant association between the journalists' use of scene construction techniques in newspaper news stories and the communication of scientific and technological information to non-expert audiences.

HA2: There is significant relationship between the journalists' use of viewpoint techniques in newspaper news stories and the communication of scientific and technological information to non-expert audiences.

HA3: There are significant differences between the journalists' use of events scheduling techniques and the communication of scientific and technological information to non-expert audiences.

#### **1.5 Scope of the Study**

The current study was on narrative journalism techniques used by journalists in newspaper news stories to communicate scientific and technological information to non-expert audiences in the North Rift region, Kenya. The study focused on the 68

journalists drawn from four leading newspapers in Kenya, that is, *The Nation*, *The Standard*, *The People Daily* and *The Star*. The journalists were dispersed across the seven counties of the North-Rift region, namely Uasin Gishu, Nandi, Elgeyo-Marakwet, Trans-Nzioa, West Pokot, Turkana and Baringo. The study narrowed itself to the transmission of science and technology information to non-expert audiences. It did not involve a study on the effects of communicating science and the technology to the audience. The study therefore confined itself to narrative journalism techniques and how journalists in the North-Rift region used these techniques to communicate science and technology information to lay, or non-expert audiences. The journalists in this study encompassed the reporters, photojournalists and bureau chiefs. The study adopted both quantitative and qualitative approaches (with the quantitative approach being dominant) to explore the relationship between independent variables (scene construction techniques, event structuring techniques and viewpoint techniques) and the dependent variable (communication of science and technology to non-expert audiences). The control variables for this study were journalists working experience, story length, subject complexity and newspaper type which were all controlled for in this study so as not to compromise the study findings. Quantitative and qualitative data were collected on each of these variables and then analyzed to determine the relationships among the variables. These relationships were established through hypothesis testing techniques. The study took a period of one year from January 2019 to December 2019.

### **1.6 Rationale for the Study**

Use of journalistic narrative techniques in news stories and the communication of scientific and technological information represent a relatively understudied area in

science communication (Dahlstrom & Ritland, 2012). Narratives, whether journalistic or otherwise, capture the psychological constitution of some aspects of situations presented from a defined perspective. Narrative techniques, therefore, represent a style of presenting scientific universe from a human perspective: providing a viable solution for addressing problems inherent in relaying science topics. Consequently, Dahlstrom & Ritland (2012) observe that little empirical published studies have yet explored this possibility a fact that supports the current study.

Besides, narration is a basic mode of human communication and a means of acquiring and sharing scientific and technological information and knowledge. In the rapidly growing field of science communication, narrative formats are emerging as a promising set of tools for motivating and supporting behaviour change. Scholars in health communication will therefore find this study useful in terms of how narrative techniques are utilized to communicate science and technology with non-expert audiences.

In the context of our daily experiences, we communicate with one another through narrative and storytelling. Narrative techniques are a core avenue through which various specific social and political establishments exchange information with the public. Political and social institutions will equally find the study useful in communicating science information with their publics. Narratives are also a basis of news reporting in journalism and thus the mass audience learns a lot of scientific and technological information from the media personnel. Thus, media practitioners like journalists will find the study significant in terms of new avenues and opportunities for communicating science and technology with their audiences.

Specific themes such as products and services, policies, and programs are all made available to our consciousness and contextualized through narratives (Gabbay & Leenders, 2003). In this connection, marketers, and policy designers and programmers will find the study findings useful in policy formulation, design and implementation on science communication with non-expert audiences. Newspaper journalists included in this study because they report for a medium in which they have the luxury of space to exercise different narrative techniques in news stories unlike reporters for the broadcast media whose reportage is constrained by the amount of airtime assigned to those news stories.

North Rift region is selected as the locale for the study since the region is a fertile ground for news stories on science and technology, notably being the home for technologies based on agriculture, the recent discovery of oil in Turkana, home to the second largest referral hospital that recently separated the conjoined twins, home to the tourist attraction sites such as lakes, gorges, geysers; home to a number of learning institutions where scientific and technological innovation are initiated. All these features justify the choice of the study location.

Finally, other researchers in narrative communication mode and scientific communication in general will find the study a useful framework from which to formulate future studies. This will ensure continuity in research and generation of new knowledge.

## **1.7 Chapter Summary**

The chapter has laid a background to the study of narration and communication of scientific information to non-expert audiences, proposing a case for quantitative

approach. The chapter has laid a background on the development of narration and its relationship with communication of science and technology. The development of this relationship has been discussed from a global perspective narrowing down to the African and Kenyan contexts. The statement of the problem has identified the gap in knowledge in narrative and science communication research, which the proposed study intends to bridge. Equally, the chapter has marked the boundaries within which the proposed study was conducted. The section on rationale for the study has argued a case for conducting the current study on journalistic narrative techniques and communication of scientific and technological communication. The next chapter reviews literature related to the current study by drawing a gap between the previous studies and the current study thus arguing a case for the current study.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Overview

This section discusses key concepts of the study. The concepts are narration as a communication mode, science communication and its relationship with communication studies, and the communication of science through narration techniques. Also discussed is the narrative theory and the dominant approaches within the theory. The chapter reviews studies in science communication through narrative techniques highlighting the research gap and ultimately argues a case for the current study. The chapter ends with a summary.

#### 2.2 Narration as a Communication Mode

This section explores the concept of narration as a communication by tracing its origin and development throughout the history of human communication. Specific reference is made to early narrative communication practices that support the idea that narration is a communication mode.

Narration as a communication mode dates back to the stone-age period (Ameriana and Jofib, 2015). During this period, caves were used as surfaces for paintings and, besides this, the pioneer narratives were told around evening fires. This was the genesis of narratives in human communication. Since then, narratives have continued to feature in nearly all forms of human communication so much that scholars have operationalized narrative in context of human communication.

Narratives according to Ameriana and Jofib (2015) characterize human communication, especially oracy. Media genres such as film cinema, news stories, television programmes and people's memoirs were all sources of information for the past and future generations.

The term narrative is a derivative of the Latin root, *narre*, which means to publicise or to disseminate information. Narration as a mode of communication can also be traced back to the days of Plato and Aristotle where a distinction between *mimesis* (imitation) and *diegesis* (narration) was made (Ameriana and Jofib, 2015). The two terms, since that distinction was made, have become a subject of study and discourse in many areas of communication, science communication, being no exception. Consequently, narration has been established by researchers as a meta-language that contextualises research and a unit of analysis in narrative discourses. Todorov (1977) coined the French term *narratologie* ("narratology") and used it in parallel with biology, sociology, and so forth to suggest the science of the narrative. This marked the genesis of the relationship between human communication, narratives, and science communication. This relationship continues to exist in modern discourse.

Anneli, Karolin and Watt (2018) define narration as a dialogic interface, be it written or oral, between the orator and one or more listening audiences. Narration, thus, is an established mode of disseminating messages and a hook for engaging audiences. Being readily synthesized by the human cognitive faculties, narratives act as a bridge between our *logos* and *pathos*; when an audience is cognitively alert to facts, there is every likelihood that the audience can sit well with the knowledge being shared. According to Rapp (2010), *logos* is the gist behind the argument on its entirety and *pathos* refers to the attendant emotions of the listener. Narratives together with the

techniques therein, therefore, are tools used to communicate knowledge and have the potential to give scientific knowledge meaning (Greenhalgh 2001), and can hook emotionally and capture the audiences thus giving credence to the scientific and technological realities if effectively utilized.

Narration as a mode of communication has been used by people to add significance to their knowledge, structure their individual experiences and ideas and relate with each other to in a shared or common contexts since ancient times. According to Anneli, Karolin and Watt (2018) narration continues to be an art form tailored to educate, inspire and communicate values and social norms. Narration as a mode of communication ideally is dictated by a structure that is based on the cause-and-effect relationships between events and usually takes place over a particular period and which affect a range of individuals (Anneli, Karolin and Watt, 2018). For this reason, it is possible to study cause and effect relationships among narratives and the content conveyed through narration. This way, the study approaches narrative as a text, and not just a story. This justifies the cause and effect relationships between the variables in the hypotheses and research questions on which this study is based.

Narration occurs in many formats and that there are many different techniques applicable in narration. Narration can be used to graphically describe a narrative using different audio-visual media, what has been described as visual storytelling. In terms of new technology, stories can be told digitally to enhance their sharing (Lambert 2013). Besides, narration often exists in traditional media as well, such as in theatre renditions. These features make it possible for journalists to use narrative techniques to communicate scientific information with their non-expert audiences. In addition, journalists are well placed to communicate scientific information since they are

professional communicators capable of packaging and disseminating information in all genres or in specific beats in which they specialize.

Narration therefore has been utilized in particular contexts for communication of scientific and technological information and has, as a matter of necessity, grown rapidly over the recent decades. Fields such as healthcare, education communication, and marketing communication are increasingly using narratives as a communication mode (Lambert 2013). In a study by Greenhalgh (2001) on health-related behaviour change in the UK, narration led to positive results. The narrative therefore remains and continues to remain a mode for communicating specific information genres to specific audiences.

### **2.3 Narration, Science Communication and Communication Studies**

This section attempts to connect narration and science communication within the context of communication studies discipline. The aim is to situate narration and science communication within the discipline of communication studies. This will provide a perspective from which to understand narration and science communication.

In the olden days, scientific and technological information was relayed as fragments of information without keeping the target audience in mind (Anneli, Karolin and Watt, 2018). This puts the audience, particularly the non-expert one, at the danger of making inaccurate inferences when confronted with scientific and technological information. Therefore, ideal science communication is deemed a very critical basis for educating, informing, entertaining and influencing change among the targeted audiences.

Use of narration serves the function of a communication mode for scientists and technological communicators. Disseminating new knowledge using narratives in which the audience relates with provides a framework in which complex scientific and technological information is presented in a way and format in which the audience can understand and analyze. The human brain thus appears apt at capturing and retaining scientific knowledge and technological content when such content is rendered through well-structured narratives (Scott, *et al.* 2013). Ideally, as Dahlstrom (2014) opines that narratives seem to deliver attendant benefits during the tenure of four key steps of processing information: motivation and interest; allocating cognitive resources, elaboration; and transfer of information into long-term memory. Some studies have established that using narratives is one the most powerful way of planting new [scientific and technological] ideas in the human brain (Stephens, Silbert, and Hansson 2010). Narratives are presumed to realise more engagement with an audience especially when compared to traditional scientific communication since use of narratives attempts at bridging the gap between *logos* (knowledge and information) and *pathos* (emotional attachment).

Although narration has developed as a means for science communication in multiple disciplines notably health care and science education (Anneli, Karolin and Watt, 2018), its utilization by journalists to communicate science and technology with non-expert audiences is yet to be fully researched and utilised to its fullest. This study argues a case for an increased and integrated use of narrative techniques by journalists in science communication to relate with the non-expert audiences.

Dahlstrom (2014) in his research on the study of science communication explores the role of narration in terms of how people perceive and respond to science [and

technology] information. He observed at least three key dimensions of what narration can be, and that, differentiating them helps to shape any discourse on the effect of narratives on communication of science information.

The first dimension about narratives, Dahlstrom explains, is that narratives seen from the perspective of information processing, which constitutes one of two distinct avenues through which information [scientific and technological] is processed, that is, narration and science. Since humans have a natural endowment as narrators, Dahlstrom argues that a number of researchers assert that humans process information in many occasions through narrative frameworks or matrices, which are seen as a natural, apt and reliable means of information processing. In contrast, Dahlstrom asserts that scientific information processing is more challenging and painstaking exercise dependent on analytical thinking skills to process facts and scientific evidence. Dahlstrom gives an example of the controversy surrounding the safety of vaccines to explain how these two matrices or frameworks compete. Vaccine proponents, Dahlstrom contends, frequently depend on scientific evidence to disseminate to the effect that vaccines are a safe and efficient way to combat illnesses. While the current study is on journalistic narrative techniques as a mode in scientific and technological communication, emphasis was placed on how journalists utilize narrative techniques in newspaper news stories to communicate science with non-expert audiences and not narratives and vaccines acceptance in health communication campaigns that Dahlstrom study discusses.

A second concept of narratives, according to Dahlstrom, are senses making narratives, which in how words he described as 'internal narrative frameworks'. These are individually-centred stories of cause-and-effect associations which originate in the

mind of an individual from direct and mediated situations and are many a times an offshoot of processing information through the narrative frames, Dahlstrom explained. These sense making narratives build up gradually through time and form a basis for making sense out of the world experiences. Dahlstrom added that sense making narratives also determine what information people look for and how, and influence how people conceptualize new information. The sense making framework is relevant to the current study especially in the selection of narratives where journalists communicate science and technology with non-expert audiences.

Dahlstrom addresses the final concept of the narrative: narrative messages that are external to the source to include what a given audience receives from outside sources, and those that are shared with other audiences. It would however be wrong to assume that all messages shared or exchanged are narratives. The volume of narrativity, that is the content or composition of a narrative varies, that research on narrative persuasion (the persuasiveness of stories) and narrative transportation (immersion into a narrative) have established beyond any reasonable doubt that the narrativity of a narrative, the more the persuasion and engagement. However, Dahlstrom adds, that narrative messages by their own nature are persuasive so much so that they can influence even when the validity of their content is in question. In this study, such narratives were not considered since they result to communication of inaccurate information thus offending the basic communication ethics. In addition, while it may be taken that questions about validity can be discussed by attaching adequate scientific evidence, Dahlstrom noted that communication scholars have found out that this is not always the case since the existing sense-making narratives inevitably address how the evidence is perceived by the audience intended. To emphasize of this case, Dahlstrom refers to studies on cultural cognition which have established that

valid knowledge about scientific issues is highly likely to be very subjective. The current study considered this when selecting the journalistic narratives for the study in chapter three.

In conclusion, Dahlstrom opines that narrative based on pathways, sense-making, and external messages can be integrated to form what has been described as “symbolic reality” for audiences with shared characteristics and experiences. Dahlstrom contends that studies on symbolic reality must incorporate scientific communication so as to enable making predictions as the audiences grapples with the concept of symbolic reality. Ideally audiences would want to make certain decisions on account of the narratives that create their symbolic, which in the context of this study is science and technology reality. The current study did not seek to make symbolic and analytical predictions, but to demonstrate how journalists utilize narrative techniques in newspaper news stories to communicate science and technology information with non-expert audiences.

#### **2.4 Review of Relevant Theories**

This section explores the main theories relevant to narration and science communication. The aim is to build a theoretical foundation for the study of narration and science communication within communication studies. The section begins with the discussion of Aristotle’s poetics, then introduces the structuralism and functionalism approaches to the study of narratives and their use in communication studies particularly to science communication.

### **2.4.1 Narrative Theories and Communication Studies**

Narration as a communication mode occurs in studies by researchers in the humanities and social sciences, irrespective of the purpose of their works, whether the studies are thus designed or otherwise. Consequently, narratology has been escalated to numerous disciplines using different methodologies. Such disciplines include but not limited to philosophy, aesthetics, history, sociology, psychology, religion, ethnography, linguistics, and communication and media studies. Since communication and media studies is one of such disciplines, this section addresses narrative theories and communication studies specifically to the use narrative journalism techniques to communicate scientific and technological information to non-expert audiences.

Given that narration has been approached from diverse perspectives, studies to narration differ comparatively. Threadgold argues ‘there are two main theoretical frameworks from which the narratives have been studied - the functional and constructionist perspectives, with former addressing the function of narratives, and the latter, how narratives are created and designed’ (Threadgold, 2005:262-267). This approach will be critical to this study especially on how the journalistic narratives can be structured to communicate science and technology information to non-expert audiences. Besides, the functionalist approach is important in understanding the function of narratives which in this case is the communication of science and technology to non-expert audiences. Ricoeur and Brooks (1984) represent an existential approach to narrative as a phenomenon giving meaning to people’s lives. The cognitive approach represented by Turner and Bruner (2006) deals with the narrative as an elementary instrument of human thought, of cognition. The current

study however does not deal with the cognitive aspects of the narrative since the study does not focus on audience effects where narrative cognition is critical.

The aestheticians, such as Sturges (1992) have examined the concept of narratives on the basis of their function and their literary value. Sociologists are concerned about contexts in which narratives are created. Technical perspectives have focused on the linguistic dimensions of the narrative subsume structuralism, and linguistics and content analysis. The gist in the technical perspectives is to contextualize narratives in the sphere of discourse analysis and theory. Narration thus becomes a text, a discourse undertaking, and a genre in communication studies (Ryan, 2004). In the context of this study narration is a text, a news story that communicates science and technology to non-expert audiences. Given such diversities it is no doubt that narratology becomes a wide field of interest for scholars across disciplines. Consequently, Tzvetan-Todorov (1977) coined the term ‘narratology’ in 1969, which in French is described as ‘narratologie’. Narratology is seen by some theorists as part of semiotics, an aspect of communication studies that deals with symbols and how to communicate using symbols.

The first attempt to study narration was by philosopher Aristotle. Conversely, Aristotle is seen as one of the pioneer theorists in narrativity. In his treatise, *Poetics* Aristotle describes works of art as imitations of reality (‘mimesis’) and identifies three aspects of imitation: medium (language, sound, music,); object (people in action, later also calling it plot) and mode (narration, action, acting). To Aristotle, a work of art is an exemplification of attendant reality (Aristotle, 1997). To this end, the analysis of television news content such as news stories can be conducted using Aristotle’s

imitation (mimesis) as one of the significant elements of narrativity in content analysis.

Literary scholars in Russian formalist and French structuralism schools of thought have contributed to the narrative theory here described as narratology. In a nutshell, narrative theories post-second world war are classified into three main strands. One, where narration is seen as a series of events with scholars focusing on the narrative excluding the medium being used. This strand subscribes to the ideas of the scholars such as formalist Vladimir Propp (1968) and of the structuralists Claude Lévi-Strauss, Tzvetan Todorov (1977) and Roland Barthes (1977). The second strand looks at the narrative as a discourse. The proponents of this strand are the Gérard Genette, Mieke Bal (1985), and Seymour Chatman (1978). The final strand sees narratives an endowment for a specific audience in context. Supporters of this post-structuralism approach are the later Roland Barthes (2004), Umberto Eco (1979), Jean Francois Lyotard (1991). They make use of linguistic aspects to expand and develop theories that connect literature and narrative studies.

*Morphology of the Folktale* published in 1928 provides a basis for all theorists of narrative studies beginning 1950s so much that hardly any the works produced on narratology fail to mention the text. The text is widely analyzed and criticized by a number of theorists of media and many have a consensus that the fairy tale is many people's foremost significant narrative and its elements inspire and are prevalent in many popular forms found and analyzed in science films. The current study focuses on the news story as a narrative capable of communicating science and technology information to non-expert audience. It focuses on newspaper and not film, or any other broadcast media.

Based on the concept of morphology, Vladimir Propp (1968) argues that the structure, form and components of a treatise, and that, his analysis identifies the structure of narrative based on the Russian folktales. He renders a chronology of functions associated with characters which are called '*narratemes*' by modern theorists and which are included, in modified forms, in many different texts of media even today. His work is critical and central to the explanation of the nature of plots and the function of characters on the basis of the syntagmatic qualities of any narrative (Berger, 1997). He draws a line between story (fabula), something that occurs on the basis of chronological order and plot; (syuzhet) that is how the author renders or tells the story to reader or audience, however the process or manner of reading, recall or experience (Lacey, 2000, p.18). Vladimir Propp (1968), moreover, is quoted by scholars such as Claude Bremond and Algirdas Julien Greimas, who, in collaboration with Victor Shklovsky, Mikhail Bakhtin, Roman Jakobson (1960), Boris Eichenbaum and Boris Tomashevsky initiated French structuralism in 1950s. Structuralism is an approach used extensively in social sciences in the 20<sup>th</sup> century. Structuralism investigates the relationships and functions of elements in a text whether narrative or literary. This approach is essential to the analysis of narratives as a text and the techniques used therein to communicate specific information to a particular and identifiable audience, in the case of the current study, non-expert audiences. but specifically on matters science and technology.

Under linguistics, structuralism it is popularized by Ferdinand de Saussure; in anthropology, it is espoused by Claude Lévi-Strauss. Structuralism has been identified as a basis of narratology since the theories of Ferdinand de Saussure and Russian formalist studies have been an offshoot of French intellectual discourse in the 1950s and the 1970s. Later, in the 1970s and 1980s, French structuralism became recognized

in the English-speaking world (Huisman, 2005). Structuralism focuses on the characteristics universal to all narratives, emphasizing the nature, form and function of narratives. Structuralism focuses on the plot of the narrative and utilises literary techniques in order to understand language use in narrative. For instance, Tzvetan Todorov (1977), the Bulgarian structuralism advocate, attempts to unveil abstract narrative patterns. It may be argued that William Labov (1972) and other scholars after him, for example, Joshua Waletzky, deal with the level of discourse. The structuralism and functionalism approach is relevant to the current study when focusing on the function and structure of a narrative that is used to communicate science and technology to non-expert audiences.

Ferdinand de Saussure is one of the founders of semiotics (semiology) analyses the centrality of signs. De Saussure's structuralist linguistic theory brought in aspects of linguistics into the humanities in the 1950s. Ferdinand de Saussure's work catalyzed the deconstruction perspective. Other scholars in narrative rendition and the study of media texts include Charles S. Peirce, Roland Barthes (2004), Jean Baudrillard (1994), Gilles Deleuze, Jacques Derrida and Umberto Eco (1979). Claude Lévi-Strauss, the French anthropologist and structuralist, contributed to the existing syntax analyses through the use of paradigms in narrative analysis. The current studies

focus on the mixed paradigm to study the communication of scientific and technological information to non-expert audiences. The narrative paradigm here involves the use of both qualitative and quantitative data to first test the hypotheses of the study and use the qualitative data to support the findings from hypothesis testing.

The syntax analysis involves investigation of the occurrences in a discourse that is structure of plots and roles played by characters. On another level, paradigmatic

studies explore the centrality of the meaning of a text to people. Roman Jakobson's (1960) binary oppositions have become handy in the generation of the meaning of concepts, notions and ideas and Ferdinand de Saussure's semiotics converge in Claude Lévi-Strauss's perspective of the binary opposites in texts enabling readers to decode the meaning of the text (Berger, 1997, pp. 30-32). Claude Lévi-Strauss studies on myths (1963) are evidence on linguistic aspects can be used in the cultural contexts. Seymour Chatman's (1978) study adds weight to the narrative discourse especially on story and discourse. He contends that a story is the composition of the narrative (the *what* of the narrative) and that discourse is shape of narrative (the *how*). According to the author, and the structuralism approach to a narrative (a narrative text, a narrative structure) comprises of two main components or sections. The first section is the story, comprising of the content (the chain of events) and the existents (the characters and the items of setting). The second section which is described as the discourse which comprises of the mechanisms of rendering the content (Chatman, 1978). The current study adopted this approach in the analysis of the function and content of news narratives that the journalists in North Rift region use to communicate scientific and technological information to non-expert audiences.

From a semiotic perspective, narratives communicate inherent meaning, and as such, comprises of the form and content. Narrative communication is therefore the narrative discourse and, story, the substance of the narrative communication discourse, will constitute form together with its content manifestations (words, pictures, etc.). A narrative therefore has content and form. The substance is the plot, series of actions by the author, and the end product, is form (Chatman, 1978).

Narration is viewed from a structuralism perspective is understood as a mode of communication, hence its utilization to communicate scientific and technological information to specific audiences, in this study, non-expert audiences. The narrators communicate content (the narrative techniques) through discourse (scientific and technological information) to non-expert audiences.

Gérard Genette, the pioneer of the structuralism analyses the elements and techniques of narrative work with three basic categories. These are tense (entailing order, duration and frequency), mood (emphasizing focalization and distance, dealing with diegesis, mimesis) and voice (incorporating narrators and speech). All these aspects and techniques have been captured under the variable viewpoint techniques, which is part of the hypotheses and research questions of this study.

Mieke-Bal (1985) understands a text as a system consisting language signs. A narrative text is one in which an agent corresponds to a narrative. A story is a fabula that is rendered in a particular sequence. A fabula, according to Mieke-Bal, is a sequence of interconnected events that that show cause and effect. This study takes the perspective that a narrative is a text, and not just a story, hence the structuralist and functionalist approach to the use of narratives to communicate scientific information to non-expert audiences.

In summary, we can posit that that structuralism is all about narrative language elements, that is, a narrative structure and principles dealing with both syntax and paradigmatic context of a narrative. Moreover, the syntax dimension connects the events of a narrative based on cause-effect relationship, hence the study's justification to adopt a cause and effect design in the utilization of narratives to communicate scientific information to non-expert audiences. The paradigm combines characters and

settings to create moods and transitions within narrative. This leads to smooth configuration of characters, settings, events and time in the in the story or narrative (Fiske, 1987), thus making narratives a text to be studied from a science communication perspective, that is, a mode in science communication.

When Vladimir Propp (1968) interrogates syntagmatic approaches of narrative in folklore, he identifies six constituents of narrative structure (preparation, complication, transference, struggle, return and recognition) with 32 inherent functions. Claude Lévi-Strauss and Roland Barthes emphasize the paradigmatic trends. Lévi-Strauss introduces binary opposites, thus demonstrating that a narrative is a rich text. Roland Barthes (1977) analyses myth as the basic unit of a narrative.

Both Mieke- Bal (1985) and Roland Barthes (1977) thus expand our sphere of understanding narrative theory by using linguistics and anthropology and then introducing structuralism and post-structuralism dimension of a narrative. In his essay on structural analysis of narratives, Barthes contextualizes a narrative within discourse analysis contending that the language of narrative is at the heart of any discourse analysis (Barthes, 1977). Narratives in this connection therefore detail a pyramid of structures which a researcher needs to take into account when studying narrative functions and when constructing narratives as well.

This study's independent variables, scene construction techniques, event scheduling techniques and viewpoint techniques captured narrative actions, functions and levels of narration in the communication of scientific information to non-expert audiences. Barthes appreciates the place of narrative communication as having both the creator of narratives and the audience for which the narratives are meant (Barthes, 1977).

This recognition clearly underpins the use of narratives and narrative techniques to communicate science to non-expert audiences.

Post-structuralists focus the structure of a narrative, which they understand as a product of structuration. By structuration, they mean the process through which both the writer and the reader share and encode meaning into narratives (Barthes, 1977). While structuralism places narrative focus on the text the unit of analysis, post-structuralist, post-modern narrative theorists de-construct the narrative text and focus on the function of a subject in the process of semiotic configuration of meaning (Barthes, 1977). By focusing on this perspective, interpretation one is able to study whoever creates a narrative.

Theorists and researchers agree on narration as discourse of media and its process of structuring meaning. Studies of media texts demonstrate that both fiction and non-fiction genres of mass media are relayed to the target audience in form of narratives (Barthes, 1977). Television content besides programming provide audiences with the opportunity to perceive reality through narration. This justifies the selection of journalists and their communication of science as a beat to non-expert audiences through such genres as news, features, documentaries, and many more. Consequently, narratives in the context of this study was are perceived a means to understand people's past experiences and moderating of scientific and technological information and practice of communication. Clearly, communication studies cannot ignore the role that narrative plays in communication of scientific information especially to non-expert audiences.

Fulton (2005) while discussing feature films and documentaries appreciates the social realities these media genres communicate. On another level, print journalism

transforms daily experiences story reality. Advertisements and commercials exist to narrate our fantasies and desires. The author continues saying that in modern societies, narratives are understood as an innate structure for humankind, whether with expert knowledge or not. At the same time, it emphasizes communication of information to non-expert audiences thus making science familiar. Thus, narrative techniques are used in films, adverts, commercials, television news bulletins, comics, or newspapers, hence their study in communication studies and in particular, this study. The basic function of narratives in the mass media is not only just to inform but also to entertain the audience targeted. But more importantly, to educate the audience especially the non-expert who may be lacking specialist knowledge.

Lyotard (1991) sees narrative communication as a mode of disseminating legitimized media 'message'. Within the narrative sphere knowledge and information are disseminated in society through narrative techniques. Hence, the narrative determines the circumstances for the dissemination of information and defines the performance of society. Narratives are the vehicles upon which society, state, institutions, producers, and individuals both appreciate and recognize their information, in this case scientific information to non-expert audiences. Media narratives reinforce standardization by offering universal opinions, preferred ideologies, and agreed-upon models. Understanding, and achieving consensus is only can be effected through these narrative games. This, ultimately, is the essence of communicating science and technology to non-expert audiences through narratives.

The theory of narration used in research into communication studies bases its framework on the discussed general narrative theories above. The modern narrative theory subsumes the structuralism and post-structuralism theories, some aspects of

semiotics and styles applicable in functional grammar. The aim is on both the generation of attendant meaning during the signification (semiosis) and also on some issues of ideology. What Marie-Laure Ryan (2004) argues that narrative in media context summarizes the elements involved in modern narrative approaches. She contends that narrative is not just a rendition based on language but a mental, cognitive entity that is brought about by signs, hence the suitability and relevance of narrative theory in communication studies, and more so in science communication in respect to journalistic news narrative techniques and how they communicate scientific and technological information.

Narratological analysis in the context of media and communication studies can be traced back to Frye (1957) and Booth (1961). The combination of Russian and French theories of narration with treatises of English and American criticism is observed in works dealing with media written by Barthes (1977), Baudrillard (1994), and Eco (1966). From the 1960s onwards, sociolinguistics study oral narratives in terms of their composition, communication, function, content and structure. Key among those who have studied narratives within a sociolinguistic perspective Thornborrow (2005), Meinhof (1994), Coupland (1999), Garrett (1998), Montgomery (2005), Threadgold (2005) and Thornborrow & Coates, (2005).

American studies of 1970s notably Jonathan Culler and Robert Scholes have discussed the interdisciplinary and international stature of narrative theory and localized them in media discourse analysis (Martin, 1986). Notable examples who infuse conversation analysis into media narratives is Deborah Tannen, Deborah Schiffrin, Harvey Sacks, and Livia Polanyi. Monika Fludernik integrates the study of literature and oral narratives (Ryan, 2004). Berger (1997) argues that reader-response

studies or reception studies as they are described argue that readers are required to approach narratives on the basis of their spheres of experience and knowledge and this prompts individual readers to decode media texts in different ways. Berger contextualizes narratives into media communication taking into account elements of social situation, author/creator, text, medium and the target audience. The aforementioned mentioned disciplines tend to use different narration modes and consequently researchers have focused their analyses on different aspects of narrative dimensions.

#### **2.4.2 Relevance of the Structural and Functional Approaches to the Study**

In the context of the current study, the selected news stories-attached on the appendix section of the thesis- are considered news narratives studied from a functionalism approach which studies news narratives from a functional point of view. The functionalist approach thus analyzes news narratives based on specific functions. These functions in the context of the current study are summarized as follows:

- i. Communicating scientific and technological reality: From the functional approach, news narratives can be studied in terms of how they can enhance non-expert audiences' conceptualization and understanding of scientific and technological realities by contextualizing meaning to their own situations.
- ii. Creation and sharing of meaning. This function is based on the assumption that news narratives create and share meaning on matters science and technology. That meaning is not only created but shared with non-expert audience on matters science and technology

- iii. News narratives are aimed at achieving a particular goal. This can be achieved by analyzing the purpose of a news narrative. This goal may revolve around the communication of science and technology to specific audiences; in the case of the current study, the non-expert audiences
- iv. **Identity construction:** News narratives play a crucial role in building and maintaining a sense of self identity. This can be done through integration of various life experiences about science and technology in the past, present and future.

The structural approach is relevant to the current study as it provides a systematic framework for delving into the universal, underlying patterns and rules that govern the use of news narratives in communicating science and technology information to non-expert audiences. The approach enables a researcher to shift focus from the certain specifics of a single story such as individual character motivations, specific settings, scenes to more fundamental structures so as to gain powerful tools for qualitative and quantitative analysis.

This approach is relevant to the current study in the following ways:

- i. **Identifying universal news narrative patterns across the selected news stories.**  
The approach enabled the identification of narrative patterns such plot, use of narrators, use of witnesses to scientific and technological events, and use of expert voices in recounting and relaying scientific and technological events.
- ii. **Providing a systematic analysis.** The approach provided insights into models such as the Deficit Model and the Participatory Model as well as the Theory of the Mind which all provide an objective, step-by-step approach for breaking

down news narratives. This systematic approach enables a qualitative and quantitative analysis of the complex scientific and technological content into more manageable and consistent information for non-expert consumption.

- iii. **Understanding Meaning Construction.** The approach enables the current study focus on how meaning is created through the scheduling of story events, scene construction and variation of news story viewpoints. The approach makes it possible to analyze quantitatively and qualitatively the relationship between narrative techniques within the broader narrative system. The approach also explains the narrative structure of the news stories and how this significantly affects the non-expert's experience and overall understanding of science and technology.
- iv. In essence, the structural approach is relevant to this study as it provides the fundamental analytical tools to understand the mechanics of a news narrative by revealing the underlying language use that makes a news narrative recognizable, coherent, and relevant for communicating science and technology information such that the non-expert audience makes sense of such information.

Based on the relevance of the structural and functionalist approach to this study, the following assumptions can be drawn:

- i. The events in news narrative can be structured (event scheduling) in manner that can relay the scientific and technological information to non-expert audiences

- ii. Scientific and technological information in a news narrative can be relayed to the non-expert audiences through a number of viewpoints (viewpoint techniques) such as expert, witness and narrator viewpoints
- iii. That the scenes of a news narrative can be constructed (scene construction) in a particular way to communicate scientific and technological information to non-expert audience.

### **2.4.3 Narratives and Communication of Science and Technology**

Having explored the concepts of narration, narratology and associated theories within the confines of communication studies as a discipline, this section proceeds to discuss the use of narratives as a mode of communicating science and technology information. This way, the review will attempt to connect the narratives and their use in communication of scientific and technological information.

Scholars have argued that it is difficult to communicate ideas but have found out that scientific concepts are more difficult to communicate due to the challenges associated with packaging and synthesizing scientific and technological information (Kahneman & Frederick 2005; Dahlstrom, 2010; Bruine de Bruin, Bostrom, 2015). This situation is complicated by the fact the audience for scientific and technological information will have to discard underlying beliefs and values on how the scientific and technological world operates. The scientists on the other hand appear rooted in their scientific literature and knowledge and at times pay little attention on how important their knowledge appears to the general public especially the lay or non-expert publics and audiences (Downs, 2014). This trend has created more barriers to the communication of science and technology especially when not much background and

context is given elaborate enough for the audience to understand the facts behind the scientific and technological information. This calls for the use of techniques that are suitable for the communication of scientific and technological information to enable the audience digest and use the information based on their needs.

Users of information generally tend to base their understanding on new or unique information the access on their existing knowledge levels in an attempt to seek interpretation of such new or special information. Inadequate understanding of issues in science and technology can without any doubt lead users of any information to make skewed assumptions or erroneous conclusions in trying to interpret new information especially when such information is on science and technology (Downs, 2014) .Ideally, more time and processing will be required for a lay audience user to digest new facts and correlate them their current understanding of the universe of science and technology especially if their understanding of that universe is flawed or skewed or even misinformed. In such situation, then, the new information may become difficult to understand and make use of. Even believing such information becomes a huge challenge. For this reason, the adoption of narratives in science and technology communication is more likely to address and overcome such challenges from both the perspectives of the communicator and the lay or the non-expert audiences (Dahlstrom, 2010; Bruine de Bruin, Bostrom,2015; Kahneman, & Frederick, 2005).Thus, the communicators employing narratives in their communication transactions may consider using narratives and take into consideration the context under which science and technology information require synthesis, explanation, analysis and elucidation through narrative voices or techniques. If the information is rendered through the media particularly news stories, then the journalist may be compelled to employ journalistic narrative techniques to

communicate to the lay audience matters science and technology. This way the lay audience acquires a new basis or matrix for restructuring their existing knowledge, or even adopt a new one when relevant and ideal understanding has been realized in tenure of communication of science and technology

Downs (2014) argues that there appears to be a challenge in communicating scientific information to people, especially lay people, who require such information to make important decisions on their lives can use it directly in their lives especially when such information is critical to mitigation of hazards and risks to their lives. Such information will involve a behaviour or lifestyle change on the part of the user or recipient in a bid to mitigate the associated risks or hazards, such as combating obesity-related ailments or smoking-related disease, which all may be catalyzed by poor or inadequate understanding of risks associated. The current thus delves into the use of journalistic narrative techniques in the communication of scientific and technological information to non-expert audiences. The use of such journalistic narratives has been limited to newspaper news stories ant to non-expert audiences.

There are a number gains derived from the use of narratives to communicate science and technology information especially to non-expert audiences, based on the manner in which narrative information is perceived and processed (Shank & Abelson 1995; Keefe, 2003; Green, Strange and Brock 2002; Hinvard & Kreuter 2007). If a narrative, especially a news narrative, is well-structured it becomes more appealing to the desired audience much more beyond the information being communicated; it can easily capture the attention of the intended audience; thus better able to contribute to the overall processing and understanding [scientific and technological] information (Graesser, Olde, Klettke, 2002). A well-structured [news] narrative is more likely to

initiate and sustain more attraction and attention compared to emotional appeals such as fear fantasy, song and so on, which are all not effective in individual and collective decision making where behavior change is required (Witte & Allen, 2000). This is not, however, to downgrade the impact of fear as an emotional appeal. The use of fear as an emotional appeal, be it in narrative format or not, pays much attention on the implied threat, thus relegating cognitive processing of the attendant scientific and technological information (Green, Strange and Brock 2002). For instance, sex education as a motif in science communication which emphasizes the fear associated with HIV, and ultimately ignores a wider context of mitigating the threat, tend to distract the audience from crucial lessons associated with condom use (Ruiter, Abraham, Kok, 2001). The current, as much as it advocates for well-structured narratives, limits itself to the use of such structured narratives in the communication of scientific and technological information to non-expert audiences. The medium involved here is the newspaper news stories.

It is worth noting that the use of compelling voices in narratives is significant. A narrative subsuming a compelling voice captures the attention of the target audience by enhancing the audience identification with the narrative message and initiating and sustaining attendant emotional reactions (Moyer-Gusé, 2000; Green, Brock, Kaufman, 2001) keeping the lay or non-expert audience in anticipation mode in line with more information on science and technology to come. Even outside media studies, writers specializing the rendition of series treatises have relied on delaying the climax through the use of cliffhangers in comic book issues and television episodes to foreshadow the upcoming events and situations. This audience involvement and engagement minimizes the kind of unfavourable reactions that are likely to emanate in upcoming contexts (Kreuter, et al 2007), creating an

individualized avenue for information delivery (Green, Brock, Kaufman, 2004). The current study however does not delve into the use of narratives outside media studies. It focuses on the use of narratives with a media studies context hence the use of journalistic narrative techniques in newspaper news stories to communicate scientific and technological information to no-expert audiences.

Associated with the use of narratives to communicate science is the accrued benefits from engagement. The benefits of engagement are in particular beneficial to audiences who with low interest in learning and acquiring new information. Examples in such situation would include adolescents, skeptics, or people in situations where they competing for attention (Slater & Rouner, 2002). Given a highly engaged audience in terms of narratives, it would be much easier to relay high volumes of information, specifically for more complex subjects such as science and technology (Green & Brock, 2002). Narratives are more relevant in addressing certain misconceptions, by uncovering associated flaws in reasoning and providing and emphasizing facts in context. As soon as the misconceptions are identified and dealt with, the narrative proceeds to create a new and acceptable framework for conceptualizing and understanding relevant information in a scientifically conventional manner (Norris et al, 2005). If all these are addressed, it is more likely to enhance understanding and memorization, but also creating a favourable environment for future scientific and technological information to be acquired and processed effectively and efficiently (Singhal & Rogers, 2002).

Narratives in science communication have been associated with behavior change on specific audiences in context. This happens in situations where ideal conceptualization of science as a concept forms a foundation for behavior change in

context. This way, narratives initiate the entire process of audience engagement towards attaining the desired behaviour. Ideally, behaviour change situations require timely decision making on part of the audience concerned such as deciding on the type of meals to take, refraining from smoking, and consistent use of condoms. Irrespective of any prior rigorous planning, if there are no ideal situation or context cues the overall intentions and decisions towards behaviour will be compromised. Narratives, in essence therefore, can achieve and sustain shared situational cues by subsuming them within the context of the narrative train, and transform the situational cues required for behaviour change. Ultimately, the narrative itself generates information about the required cues generating memory matrix for storing information required about behaviour change through the communication of scientific facts behind the transformation towards the desired behaviour. While the current study appreciates the role of narratives in communicates scientific messages towards behaviour change, it takes a departure from behaviour change to the communication of scientific and technological information to non-expert audience through news stories in newspaper. The narratives in this context are news narratives in particular.

Narratives are also significant in guiding actions (Downs, 2014) whether the actions are the reception and processing scientific and technological information, a change of perceptions, overcoming resistance to certain vaccines and so on. Narratives are relevant in guiding specific actions by creating a model for the required actions, thus promoting a memorable situation in which a subject is taken into the required and targeted actions by overcoming the barriers to the expected actions (Hinyard, & Kreuter, 2007). In the context of the current study, the required action on the part of the recipient of scientific and technological information is to adequately inform the lay or non-expert audiences matters science and technology. This will change their

current misconceptions about matters science and technology. It will also guard the lay audience against misinformation and disinformation about scientific and technological concepts. This way, narratives become critical in modifying the mindset of the lay people towards science and technology and combating misinformation about scientific and technological ideas.

Kopfman, Smith, Ah -Yun, Hodges, (1998) caution on the use of narratives in systematic processing of information. Narratives need to be cautiously used in systematic processing of information, since they are not apt at initiating verbatim memory recall. The writers contend that narratives should not be employed as mere dumbed-down science, stressing a couple of key aspects and taking a presumption that the other aspects of the situation intended does not exist. It is important to take into account that keeping the message too simplistic in narratives in situations where elaborate information is required, a narrative will most likely initiates grounds for more information seeking. Narratives in essence have the potential to lay the framework for new information. Kopfman, Smith, Ah -Yun, Hodges, caution is useful to the current study in making decision on the extent to which narratives can be employed in the communication of scientific and technological information and the volume of information on science technology that can be communicated as consequence.

The development of narratives to communicate scientific and technological information is key if the lay or non-expert audience are to make sense out of such information. Some writers are skeptical of the factors to take into account when developing narratives (Dahlstrom,2010; Dahlstrom,2013). For instance, it has been argued that fiction and non-fiction narratives are more likely to engage audiences

almost in the same manner (Green, & Brock, 2000), without necessarily generating content with high fidelity to the content of a particular situation. On another level, conversational narrative is more likely to be more trusted and credible comparable to a testimonial narrative (Slater et al, 2003). Some scholars consequently suggest that using many voices and perspectives is more likely to convey more complex scientific ideas and processes (Kreuter, et al.2007). The current study however does not attempt at creating or developing narratives for use but will adopt existing news narratives in newspapers and examine the journalistic techniques used therein to communicate science and technology messages to lay or non-expert audience.

Scholars (Janz & Becker,2006; Glanz & Bishop,2010 ; Michie & Abraham 2004;) have paid more attention to the generation of scientific content used in narratives. In their efforts towards generating scientific content that will form the basis of the narrative, the scholars have argued for a model or theory for assessment of scientific content to use. Some science communications have been based on social cognition models for example those in health related fields where models such as the health belief model (Janz & Becker,2006;) while some scholars have employed theories such as the theory of reasoned action (Glanz & Bishop,2010; Michie, & Abraham 2004). It is worth –noting that such models and theories emphasize limited forms of behavior such as the benefits accrued from some elements of self-efficacy. For scientific content development, the models and theories are relevant to the current study since they provide a framework in understanding the process of developing and generating scientific and technological content to be communicated in journalistic narratives. In any communication, it is paramount to understand the source of the message and how it is designed or packaged to be able to determine how such message is, or will be received by the receiver. The current study, however, does not focus on the generation

of scientific content for narratives but the communication of such content to non-expert audiences through news narratives.

Related to the social cognition models, is the “mental models” frameworks which applies theoretical ideas within a given domain. This ultimately creates a framework to identify the ideal content to be relayed in science communication (Morgan, et al 2001). Consequently, it becomes essential to use the mental models framework in identifying the gaps in knowledge and misunderstandings that need to be rectified in any science communication approach (Bruine & Bostrom 2014). The mental model approach, therefore, is used to draw similarities and differences between the expert model and the descriptive model of people’s real understanding of scientific information or messages. If there are any form of discrepancy between the in terms of understanding the scientific and technological messages, then these discrepancies can be fixed to effect the communication of science and technology.

The expert model then, as its name suggests, is designed using ideas derived from the scientific literature, including the contributions from experts, in an effort to identifying the most ideal variables in communicating science and how the said variables are related to each other (Downs,2014). This model thus identifies what the audience of science communication need to know so as to make the ideal decision in a given context or situation (Downs, de Bruin, Fischhoff 2008). Outside communication, the expert model may be used to design descriptive research by structuring interviews and surveys in order determine the levels of knowledge especially scientific knowledge and their perception of such knowledge by identifying the contexts where misunderstandings or gaps in knowledge are likely to limit scientific knowledge dissemination.

Importing scientific and technological content into narrative form entails prior understanding of the nature of the audience in context and their involvement in the entire process of scientific communication. For instance, contextual disparities in the narrator's voice is more likely to affect the general tone of the communication and the manner in which the audience perceives the voice. For instance, a voice that sounds authoritarian won't go down well with the audience since the audience might feel information is being imposed on them. Thus, structuring the narrative voice in a manner that the audience can identify with is more likely to increase the impact of effectively communicating science (Whitehead & Russe, 2004). The current study appreciates the role of the narrative voice in communicating scientific and technological information. However, the nature of the audience targeted with the narrative voice needs to be specified, which in the context of the current study is non-expert. The narrative voice is that used in news narratives rendered in newspaper news stories

Ideally, when using narratives to communicate science with different audiences, deciding on the ideal voice can be a challenging task. Such use of voice in narrative communication must capture the audience and prepare the audience to accept the scientific message. For instance, a group of adolescents may be reluctant to accept messages around irresponsible sexual practices when such messages come from their parents since the adolescents might find the motive of such messages suspect; they may want to receive such messages from their peers and people they can identify with. Consequently, the best approach would be to conduct repeat testing of draft content of the scientific message in order to pinpoint the areas where the voice is not in synch, and make the required revisions to arrive at the ideal tone to enhance the applicability of the advice (Downs, 2014). Ensuring the right voice is essentially

critical in situations that entail social negotiation. When, for example, communicating on subjects such as relationships between people, behaviour expectations, and any other social themes, narratives can subsume a variety of social strategies. These strategies include presenting various perspectives, engaging various emotional reactions from the audience, and the use of behaviour models (Downs, 2014). For example, a narrative may be utilized as a substitute or supplement challenging interpersonal communication transactions such as discussing sex or body functions to adolescents where a peer narrator employing an appropriate tone in the narrative voice will most likely produce more impact in terms of the communication efficacy. Downs (2014) discusses vice and other narrative tools in the communication of science in health-related contexts requiring behavioural change. The current study discusses the use of narrative techniques, though in science communication, but in communicating with non-experts. Besides, the narratives in question are news narratives rendered in newspapers.

Winterbottom, et al (2008) argue that conflict is central in understanding a narrative and the context in which communication takes place. Conflicts are important to a narrative since the situation in which it occurs is crucial to the audience since the audience is able to identify with it in terms picking the right lessons. Key concepts in a conflict if well understood form a foundation for providing new information especially when such information is about science. If the conflict is based on familiar characters grappling with commonly held misinformation triggers audience's discussion about such information and thus inviting a factual scientific explanation around science and technology concepts espoused by a narrative such that the resolution ends up with factual lessons as opposed to misconceptions around scientific and technological issues.

Winterbottom, et al (2008) warn against dangers associated with the use of narratives especially based on the emotional appeal, that is, the potential to communicate biased information. For instance, the writers observe, someone with a biased intention can use a narrative to present perspective of a concept to the audience about a particular scientific issue ignoring a complete perspective associated with the concept. The presentation of biased information may also extend to concepts with wide scientific consensus for example the hazards associated with prolonged smoking, climatic change hazards where, there is a tendency to espouse the worst-case aspects of the discussion more than the ideal outcomes (O'Neill & Nicholson-Cole,2009). In such contexts therefore the narratives are considered may be quite manipulative from both the perspectives of the scientists and audiences, thus undermining the important element of trust in narratives which eventually escalate hostility in in the ensuing debates. The writers offer a solution to avoid biasness that undermines trust in narratives used to communicate science. In upholding trust, those who create narratives are entrusted with the responsibility of being true to science whenever communicating. There is even more need to consider the balance of data on all sides of scientific concept and not just select particular concepts for just supporting a particular discourse. Portraying a worst-case scenario tends to convey the impression that suggests that the scenario in question therefore misrepresenting the related outcomes (Tversky & Kahneman,2010). Care therefore needs to be taken against limiting information so much that the whole communication ends up in biases, especially the selection bias. This requires more vigilance to check such bias. But in situations where significant disagreement or controversy exists, a narrative may resort to a companion source document which is authoritative enough to attribute all claims and explanations. Attributing information to reputable, peer-reviewed original

scientific sources will add more credibility to information. Such caution by the cited writers is crucial in selecting the narratives used to communicate scientific and technological information to non-expert audiences. This will ensure that the information communicated to non-experts on science and technology does not compromise trust on the part of the audience and undermine the whole process of scientific and technological communication.

Great care is normally taken to ensure interactivity in the use of narratives to communicate science and technology. Interactivity ensures crucial benefits for renditions using narrative, but attendant challenges for example the use of nonlinear plots in narratives to enable the audience pick ideal choices of scientific concepts within a narrative (Ochs & Capps, 2009). Interactivity is applicable in situations where the ensuing situations require different actions such as precise medical procedures and complex human interactions (Tuong & Larsen, 2014). In such context therefore, a narrative science communication may entail alternate stories that structured as contrast stories, but structured in a manner that creates interest, giving an avenue for the audience to have many and varied exposures to important sources of information without exposing the audience to redundancy. This makes the audience feel in control while picking the choices that promote both engagement and interactivity in terms content engagement thus regulating exposure to scientific content. Hinyard & Kreuter, (2007) suggest that the best way of encouraging interactivity in science communication through narratives is the use of video. Video especially when dramatized is more likely to enhance identification with characters, thus promoting the levels of narrative audience involvement, and in the process, wide acceptance of the scientific information being communicated, and invoking the memory of the episodes in familiar situations (Dahlstrom, 2014). Communicating

science using interactive video narrative has the capacity to self-reinforce the medium in a manner resembling the video game scenarios. This strategy makes use of the addictive nature associated with video entertainment where the audience repeats variations of the same tasks over time thus perfecting efficiency at the required tasks. This strategy is essential in science communication with narratives because it sustains the audience's attention and thus availing interactive tasks to reinforce material in line with the results required in science communication. The current study appreciates the concept of interactivity associated with use of narratives to communicate science in context. This interactivity completes up and reinforces science communication. However, the current study focuses on narrative techniques, not in medical practice nor behaviour change, but in news narratives to communicate scientific and technological information to no-expert audiences

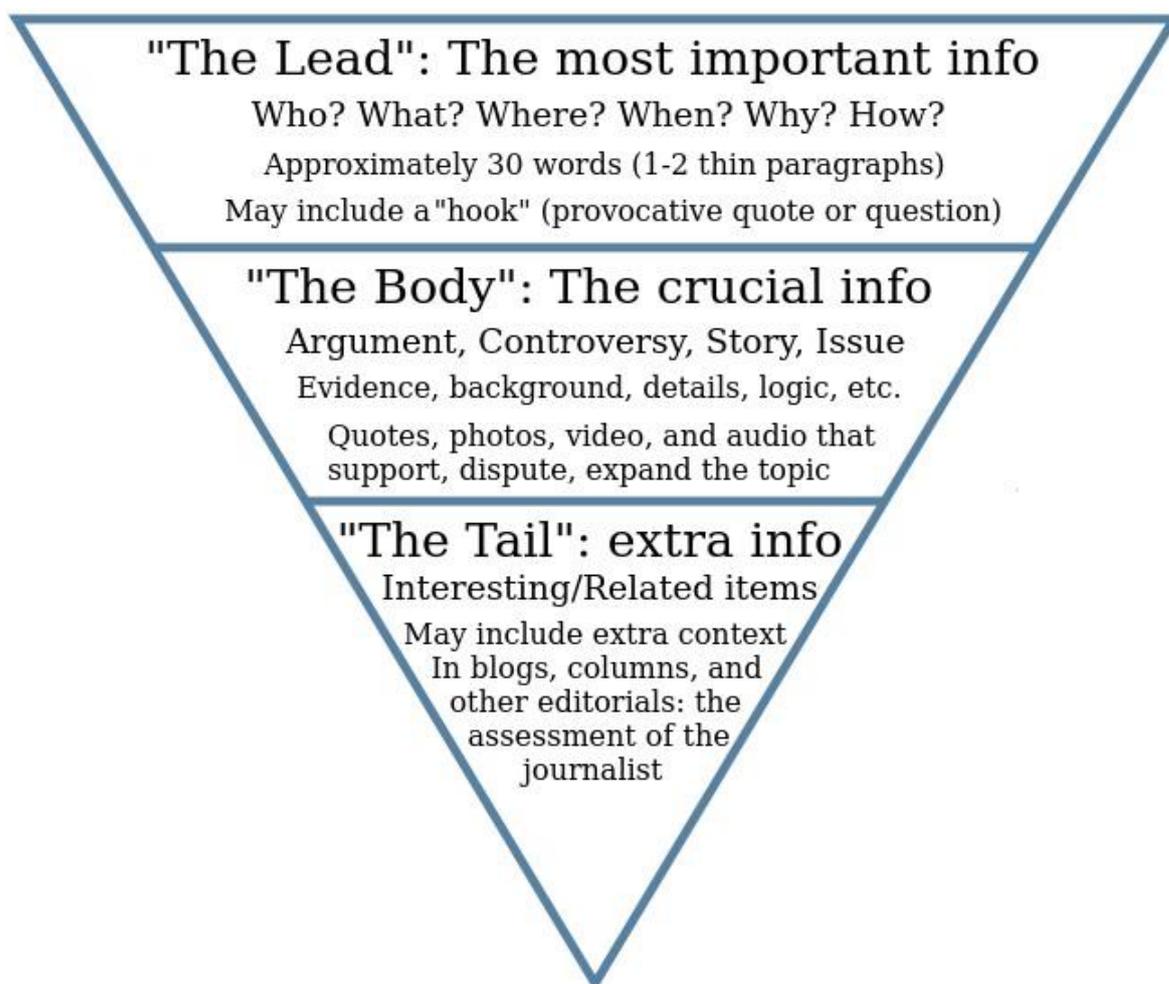
Finally, to evaluate science communication with narratives, there is need to undertake evaluation in terms of the impact of the undertakings (Downs,2011). The evaluation measures include enhanced understanding of the science and technology concepts being communicated and the determination of engagement will be determined the levels of involvement in scientific measures such as behaviour change. For situations where the communication was designed to change behaviour in a population, an outcome evaluation would be designed to determine how behaviour change occurred and the risks minimized through such behaviour change. In other situations, evaluation would include determining the reliability of the communication initiatives across multiple situations of use (Oakley et al 2006). Use of narrative thus aids in conveying scientific information in a structured format to enable the audience to synthesize and recall pertinent processes that would in ordinary circumstances be difficult to synthesize. Thus, scientific narratives have the capacity to deliver science

to audiences who in turn can use their enhanced understanding to make desired decisions at individual and collective levels. The reviewed literature in this section has demonstrated that using narratives, a communication can provide ideal opportunities for the audience to re-evaluate long-held beliefs that are not based on fact, and initiate understanding that will eventually form a basis for new scientific information. Whereas the concept of evaluation to determine the efficacy of narratives in science communication is useful, the current study does not endeavor in evaluating or determining the efficacy of the narratives in science communication, but to study the narrative techniques used in journalistic narrative to communicate scientific and technology to non-expert audiences. The context of narrative science communication is the newspaper news stories and not behaviour change communication.

### **2.5 The Inverted Pyramid and the Narrative Style in Newspaper News Stories**

This section explores the use of the narrative style in newspaper news stories. The section also introduces the inverted pyramid style and how it is used to develop breaking news stories, then discusses the transition from the inverted pyramid style to the pyramid style which uses the narrative mode.

Print journalism has over the years embraced the use of the inverted pyramid, a writing style that came to prominence during the latter part of the 19<sup>th</sup> century (Johnstone, 2008). Since the 19<sup>th</sup> Century, the inverted pyramid has remained a popular style in newsrooms. The inverted pyramid style is illustrated in figure 2.1



**Fig.2.1 Inverted Pyramid Style for Writing News Stories**

Source: Johnstone, 2008

Johnson (2008) has established that other styles have cropped up to share the space at the front pages of daily national newspapers. One such style is the narrative style, a product of literary or narrative journalism, which emerged in 1960s. According to Johnson therefore, narrative news writing and its techniques will become handy for the future as newspapers are strategizing for the expanding market of newspaper audience. It is within this premise therefore that the current study sought to investigate the use of journalistic narrative techniques in newspaper news stories and their

communication of scientific and technological information to non-expert audiences focusing on four Kenya's leading newspapers.

De Silva (2007) provides the reasons for the adoption of the inverted pyramid style and why it became popular during the 19<sup>th</sup> Century. He argues that the inverted pyramid was not related to writing or reading of news, but on rapid filing of news stories over the telegraph and this enabling editing by photojournalists who had to set the stories in the inverted pyramid style. De Silva thus is emphatic that these reasons are now many years behind us and that the need to chop a news story bottom-up which was common and significant in the days of telegraph. These sentiments were therefore a driving force towards the study of narrative techniques as an emerging style in the writing of newspaper news stories.

Ricketson (2004) notes that literary or narrative journalism is more common in magazines than newspapers; and in the United States and the United Kingdom more than in Australia (2004). While this is not a comparative study, it does set out to investigate the observation that narrative journalism is not widespread in Australian newspapers. Based on this assertion, the current study undertook to investigate the use of narrative techniques, a product of literary or narrative journalism, in Kenya's leading newspapers to ascertain or discount Ricketson's claim.

Johnstone (2004) for instance found out that in the Australian literature, the inverted pyramid has been one of the main paradigms for teaching and describing how to report and write news (Conley, 1997; White, 1996; Granato, 1991). While still very much presented as a primary option for news writing, there has been a move in recent in recent times where the inverted pyramid is preferred as style of writing and

reporting news stories in newspapers. This thus shows a trend towards the narrative approach. To ascertain or discount this trend in newspaper news story writing, the current study was undertaken in respect to Kenyan newspapers.

Johnstone (2004) notes the reasons for the shifting of writing styles from the inverted pyramid to the narrative style. The shift from the inverted pyramid in newspapers to the narrative approach can be attributed to the changing consumption patterns among media content consumers; newspapers losing their audience niches to other media such as magazines, TV and the internet, just to name a few. Thus, according to Johnson, there is a need to engage more with the reader. The writer cautions that the shift though is a guarantee for gaining the lost readership. It has been argued that narrative journalism or longer form journalism might assist with the task of regaining the reader from other media which “notoriously pilfer audiences from the pleasures of print” (Weisstuch, 2001). Based on these observations therefore, there was need to undertake a study on narrative techniques in respect to newspaper news stories and how such news stories communicate science and technology to a specific niche of the audience.

Different scholars have made a distinction between ‘soft’ and ‘hard’ news, opining that soft news can, and does indeed, incorporate a more narrative style, while hard news is still stuck in the more traditional inverted pyramid style. For example, Fulton argues (2005) that hard news is conventionally located in the first few pages of the newspaper and has the largest amount of column inches devoted to it, whereas soft news stories are not (necessarily) specific to a particular day, but provide background, human interest or light relief. “Soft news stories appear to be more obviously structured as narratives, with many of the features of fictional narratives” (2005:

226), Fulton's distinction is therefore important since it clarifies the contexts in which narrative journalistic techniques are effectively employed in respect to news stories in newspapers.

In defense of the narrative style, Johnson (2004) notes that that inverted pyramid style of journalism portends a snapshot of layered meaning. Johnson opines that other forms of writing may bring in multiple layers of meaning. Franklin (2007) notes three layers in storytelling. The top layer is what actually happens (factual, as in the inverted pyramid); the next layer brings together the story characters and the reader's feelings (emotional); the final layer provides a rhythm and a universal theme. At the extreme end of the inverted pyramid scale is the simplest of stories; the brief. The narrative style thus renders more information and thus engages the readers more than the inverted pyramid style and as such introduces rhythm to the story qualities that make the narrative style suitable for communicating scientific and technological information to non-expert audiences.

## **2.6 Review of Literature based on Research Variables**

This section reviews literature based on the research variables in the proposed study. These variables are viewpoint techniques, scene construction and event scheduling. These variables have already been captured in the research hypotheses.

### **2.6.1 Viewpoint as a Technique in Narratives**

Viewpoint as a narrative technique has been discussed under literary theory (Kobie, 2016). According to Kobe, such discourse has revolved around the character who details the story (the narrator), and the character who perceives and takes part in the events of the story (the focalizer). The writer continues to argue that a story can be

narrated, first, from the external viewpoint of the narrator, where those reading the story are introduced to the words and actions of the character but remain in ignorance about the character's inner life. This technique, according to Kobe, is reminiscent of how which we see others in the real world in terms of their actions and utterances, but we are not aware of what goes on in their minds. Second, a story can be narrated from an internal viewpoint in where those reading the story are presented not only with the actions and utterances of the character, but also with that character's thoughts, feelings, and perceptions. Consequently, the news events are communicated through the mind and sight of a character.

Berning (2011) adopted the dichotomy developed by Genette (1980) to analyze the utilization of viewpoint among the other narrative techniques in a collection of other journalistic narratives. The collection comprised of a catalogue of 25 German prize-winning and nominated news narratives about people, events, and social milieu. The results of Berning's analysis demonstrated that in most of these stories the events were narrated in a non-chronological order and the narrator's monologues in these narratives are used to capture the viewpoints of people involved. Based on these results, Berning (2011) concludes that in many of these sampled news stories, the events are rendered non-linear order and that the use of monologues are important in demonstrating the viewpoints of characters in the story (Qtd in Kobie, 2016). Based on these findings, Berning (2011) arrives at a conclusion that narrative journalism comprises of some traces of literary fiction. Berning's (2011) study delved into the use of narration techniques in news stories as well as their in-depth examination into the function they perform. Berning (2011) study is however on a wide range of journalistic genres. This study limited itself to news stories only, and where the

subject is on science and technology and not the range of subjects discussed in Berning's study.

Although Berning's (2011) study has provided valuable insights into the use of storytelling techniques in journalistic stories, it also gives rise to further in-depth examinations. For instance, in analyzing event orderings, Berning (2011.) classified stories as either "non-chronological" or "chronological.". Journalistic stories are, however, rarely told in a completely chronological fashion; rather, they are characterized by a cyclical structure in which events are repeatedly narrated in a discontinuous manner (Bell, 1991). In addition, narratives can describe events in many different non-chronological orderings, and different orderings lead to different reading experiences (Brewer & Lichtenstein, 1981, 1982; Hoeken & van Vliet, 2000; Knobloch, Patzig, Mende, & Hastall, 2004). Classifying news stories as either non-chronologically structured or chronological. This results demonstrate that news stories can be rendered in different chronologies be it systematic chronologies or non-systematic chronologies based on the viewpoint techniques the writer adopts in the story. These chronologies are thus a function of viewpoints the writer adopts in a news story.

Genette (1980) contends that the nature or type of viewpoint can differ considerably across narrative sections, where sections comprising of internal viewpoint (internal focalization.) may switch with those having an external viewpoint (external focalization). Through the selection of the narrative as analytical unit, Berning (2011) analysis provides equivocal results with respect to viewpoint representation on a global level. At a global focus, the researcher finds out the stories are identified in terms of the viewpoint external to the narrator and that articles where the viewpoint is

internal to the narrator do not exist. Nevertheless, she established the use verbs of cognition and free indirect discourse, which to her is evident of the linguistic manifestations of an internal viewpoint (Farner, 2014), are common in the articles in her corpus. These paradoxical findings invite more refined analyses of viewpoint as a technique in news narratives. These findings provide a basis upon which the current study was developed in particular with the use of viewpoint as a narrative technique but in a different beat-science and technology- where viewpoint as a narrative technique is adopted as one of the independent variables of the study and the extent to which it can be utilized to communicate science and technology information to non-expert audience. The nature of audience in Genette (1980) story analysis was not defined, hence the need to define the audience in the current study as non-expert.

Farner (2014) studies the presence of linguistic narrative techniques in news stories in order to determine the correlation between their form and function, and more specifically of how these narratives enable readers to virtually experience news events from up close. The purpose of these analyses was to detail a broad array on the use of viewpoint representation techniques. Farner finds out that a news narrative can portray a character's geographical viewpoint, cognitive viewpoint, viewpoint relating to the choice and use of phrases. For Farner, these elements of viewpoint achieved through a matrix of the elements of language related to viewpoint analysis. By the use of indefinite noun phrases to refer to entities that are known to narrator and reader but unknown to the character (Sanders & Redeker, 1993). Farner also established a psychological viewpoint that was effected through the use of verbs of cognition or what some writers calls epistemic modality (e.g. Farner, 2014; Sanford & Emmott, 2012). Therefore, any study based on viewpoint as a narrative technique in news stories containing science and technology information for non-expert audiences may

thus require a study of the manner in which viewpoint techniques are used in news narratives, hence the relevance of the viewpoint techniques to this study.

Langacker's (1987) conceptualizes viewpoint in two strands: vantage point and orientation. According to Langacker, vantage point is the perspective in which the story is told and rendered while the orientation is the subsequent portrayal subjects and events of the story from that from perspective. A vantage position is rendered in a story through the selection of semantic or syntactic depiction of a scenario, especially where alternative encodings exist (Fillmore, 1997; Kuno, 1987). For example, in the sentence, "Paul left the room", the vantage point can be traced outside the room, but in the sentence, "Paul entered the room", the vantage point is traceable to the inside of the room. The subsequent rendition is clearly different for the two sentences, which can be alluded to equating a vantage point to a camera, focusing on the outside of the room in the first sentence, whereas the same camera will focus on the inside of the room in the second sentence. Viewpoint as a narrative technique, in this case, can be seen to be confined or restricted to a place or location thus, the implication of a restricted representation.

Sanders and Redeker (1996: 293) have also discussed the concept of viewpoint in the context of confinement where viewpoint as a narrative technique is confined to the subject of news story such that the information can be ascribed to that subject in any discourse. This concept can be understood through the framework of a theory called Mental Space Theory (Fauconnier, 1985) Mental Space Theory (Fauconnier, 1985) offers a framework to account for such validity restrictions in terms of embedded mental spaces. Sanders and Redeker Mental spaces are conceptual domains that are set up and linked to one another by linguistic elements with the effect "to create a

network of spaces through which we move as discourse unfolds” (Sweetser & Fauconnier, 1996: 11). This will entail what is described as the basic space, which constitutes speaker’s reality and viewpoint, engrossed in the basic space, thus rendering additional viewpoint over and above those of the speaker. This linguistic matrix to viewpoint is a useful framework in analyzing viewpoint as a narrative technique in news stories that communicate science and technology to non-expert audiences.

Kobie (2016) argues that the embedded spaces are linked meticulously to the linguistic elements, which Kobe calls space builders. For example, in the sentence Tom believes that Nairobi is the capital city of Kenya, the verb *believes* constructs an attached space called embedded space such that the information in the predicate of the sentence is on true and correct from the embedded space as opposed to the basic space (Kobie, 2016). The information is, therefore, valid based on Tom’s viewpoint, as opposed to the speaker’s point of view. Viewpoint spaces thus become connected to the story viewpoint by a number of linguistic terms such as auxiliary verbs, verbs of direction or movement, speech and thought expressions, verbs related to perception and cognition, and expressions that mark opinions (Sanders & Redeker, 1996; Sanders & Spooren, 1997). We may therefore argue that Mental Space Theory explains the presence of linguistic occurrences of viewpoint, accounts for the validity of the information relayed, and details how these occurrences guide people’s understanding the news story through mental spaces through which to visualize the story in a particular viewpoint (Sanders, 1994). In the context of non-expert audience in science and technology matters, viewpoint techniques if effectively utilized by journalists in news stories will enhance understanding of the subject matter being communicated.

In other studies, cognitive studies of narratives have centered on the way people conceptualize narratives, how they portray narrative world views, and how linguistic features (Bernaerts, De Geest, Herman, & Vervaeck, 2013) guide the processing of information from narratives. Cognitive linguistic relations of viewpoint become crucial in understanding the processing of information and ideas as they locate viewpoint related to language to construction of realities and how these realities are understood within a narrative. This enables the non-expert audience to understand and synthesize the scientific and technological information presented through narrative techniques.

Dancygier (2012a) discusses several linguistic parameters which regulate the alignment between the viewpoints of narrator, character, and reader in narrative discourse. One of these parameters is the choice of tense. Dancygier (2012) emphasizes a tense in the past generates a time distance between the viewpoints of narrator and reader on one level, and the viewpoint of the character on the other. Present tense collapses this distance. In other words, the viewpoints of narrator, character, and reader [viewer] are in present tense narratives structured alongside the time marker. A second parameter is what Dancygier (2012a: 75) refers to as “the profiling of Ego-viewpoint”, a process which occurs when the viewpoint of a character is embedded and the narrative events are (temporarily or continuously) related through this viewpoint. In journalistic writing of news stories, the attachment of a character’s viewpoint is made possible through the rendition of that character’s speech or thought in the direct, indirect, free indirect, or distancing indirect mode. (Sanders & Redeker, 1996; Vandelanotte., 2004b)

Alternatively, references to a character's cognitive, emotional or perceptual state create an embedded viewpoint without representing any speech or thought (Sanders & Redeker, 1993). Such implicit viewpoints are established by verbs of perception (see), cognition (think), emotion (enjoy), modality (must), evaluation (like), and opinion indicators among other linguistic expressions (Sanders, 2010). Embedding viewpoints differently will effect different levels of viewpoint blending (Dancygier, 2012). The utilization of the concept of viewpoint compression, which in other studies is described as blending (Fauconnier & Turner, 2002), or intertwining (Sanders, 2010.), combines various aspects of a variety of mental spaces into what these writers describe as a new conceptual domain. Speech and thought expressions occurring in free indirect mode and implicit viewpoints suggest blended viewpoints in manner that the such information is ultimately attributed to a given viewpoint. Sanders (2010) study has demonstrated that both the embedding and blending of viewpoints exist are prevalent in the genre of news narratives. The current study relied on the cited studies in relation to viewpoint attribution in an attempt investigate the use of viewpoint as a narrative technique, and how it can be used to communicate science and technology with non-expert audiences in selected news stories.

A number of studies have been conducted on narrative news as a genre. Kramer (2000), for instance, noted a shift towards narrative writing in American newspapers while admitting that this shift had yet to be examined in an empirical, quantitative way. A similar observation was made by Hartsock (2007: 258), who wrote about an increasing number of newspaper journalists are appreciating the narrative form. Hartsock credits this to the many of the Pulitzer Prize-winning narratives between 1994 and 2004. Shim (2014) on his part argues that narratives dominant in modern newsrooms, thus subjugating the role of the inverted pyramid as a standard and

established news writing format. Shapiro (2006) on his part established that newspaper narratives are not a recent venture in storytelling particularly in newspaper journalism as form of journalism. Few studies have delved into the study of the trends associated with the high number of narratives in newspapers, more so on narrative techniques in news stories communicating science and technology to non-expert audiences. This trend informs the current study on journalistic narratives used in newspaper news stories to communicate scientific and technological information to non-expert audiences.

Weldon (2008) conducted a comparative study between the number of stories that were carried on the front pages of selected American newspapers for a period of three years (2001 -2004). The study focused on a total 160 front pages contained in a selection of twenty newspapers. The results established that the percentage of stories increased from 35% in 2001 to 50% in 2004. Weldon (2008) on the basis of the findings concludes that the content the newspapers carry on the front page revolves around a feature story or a narrative as part of the hard news. However, a critical analysis on the methodology adopted in Weldon's study reveals that this conclusion is too much based on generalities. To begin with, the news stories sampled were grouped as stories if they focused on events that were not highly newsworthy, that is, "events that did not happen the day before, and, as such, did not meet the essential news criterion of recency" (O'Neill & Harcup, 2009). Moreover, articles that carried recent, newsworthy events were categorized as hard news stories. This categorization is based on the level of currency as crucial news value, rather than stylistic criteria indicating an article's degree of narrativity. The results from Weldon's (2008) study to this end do not therefore provide any conclusive evidence about the supposed proliferation of narratives. In a nutshell, the study shows the proliferation in terms of

the level of publishing of articles about non-recent events, which can be attributed to an increasing trend by newspapers to provide background information and context to news details in the sphere of knowledge of the audience through their all-day access to online media outlets. Even so, the focus of Weldon's study is on newspapers alone leaving out radio and television as mass media for news. In addition, the focus was not limited to science and technology as a subject matter; neither is it clear whether the audience in the study is non-expert. This was the focus that the current study took in narration techniques utilized in news stories by journalists to communicate science and technology to non-expert audiences.

Johnston & Graham (2012) did a comparative study between the number of inverted pyramid articles, narrative articles, and the hybrid forms in a collection of 5,000 Australian newspaper articles published in the years 2007 and 2009. The writers found out that the proportion of narratives comprising of viewpoint as a technique had reduced while the percentage of hybrid articles had increased. Comparing these results to those of Weldon's (2008) study, Johnston and Graham (2012: 530) conclude, the writers conclude that "Australia has not embraced narrative news writing techniques in the same way as the North Americans". Their results are remarkably different from those of Weldon (2008) a trend which can be attributed to the considerable differences in their respective categorization of what constitutes news narratives and the techniques behind their crafting. Whereas Weldon (2008) employed content as a criterion, Johnston and Graham (2012: 522) employed stylistic criteria and classified articles as narratives based on features such having feature lead, tending to create a scene, time-line or introduces a character at the start, making use of a conversation or unconventional narrative strategies; describing word choices, using storytelling rendition techniques notably description, scene-setting, place or

time constructions, and character development. Even more challenging is the issue that these criteria are various and difficult to link, which makes it hard to fully embrace the findings from the reviewed study. There is lack of clarity on what exactly constitutes “conversational or informal storytelling approaches” or “place or time reconstruction”. A point of contention is that in both studies, the news narrative was selected as the subject of analysis. This approach does not recognize the existence of news texts that vary in terms of the quantity and nature of narrative features and possibly techniques such as viewpoint techniques. Johnston and Graham (2012) did include a “hybrid category” to account for articles that showed both elements of news narratives and non-narrative news articles, but again the classification criteria are rather opaque. Articles were classified as hybrid articles if they “began with a narrative style lead and used storytelling approaches for several paragraphs, then moved back to the more traditional information-based approach” (Johnston & Graham, 2012: 522). It is not concrete where exactly the dividing line between narratives and hybrids lies, thus one wonders whether the various categories were mutually exclusive or inclusive.

In sum, the studies discussed above analyzed news narratives in a much wider range of categories and covered relatively short time spans. Moreover, the studies excluded radio and television as news media. The audience in targeted by the newspaper was not defined neither the subject content or beat of reportage. The present current therefore seeks to examine the utilization of narrative techniques by journalists in newspaper news stories to communicate science and technology to non-expert audiences. The studies under review however provide a useful framework of narrative techniques in selected newspaper stories in particular how the use of viewpoint representation techniques has developed over time within the genre of news narratives

### **2.6.2 Scene Construction and Event Structuring as Narrative Techniques**

The practice of narration within the realm of news journalism is a motif in the contemporary news writing and reporting endeavours as seen in the increasing number of newsrooms appreciating and up taking narrative formats to deliver their news content (Shim, 2014). The use of narration techniques to render news has been a classical practice. By the beginning of the 18th century journalists had already embraced the combination of literary and journalistic elements in their news writing (Pottker, 2014). The rise of professional journalism in the early 20<sup>th</sup> century resulted in objectivity in the midst of literary writing aspects especially those associated with prose. The upshot of all these developments was the shift towards the non-chronological pyramid style in which the story scenes and events were rendered in non-chronological order as opposed to the chronological order associated with the inverted pyramid style of writing news (Hartsock, 2000).

The 1960s heralded the genesis of the New Journalism movement in the American and European continents. New journalism began to embrace literary techniques, such as event structuring and scene-by-scene reconstructions, in rendering newsworthy events. This marked the beginning of new journalism also described as narrative journalism because of the use of literary techniques in the writing of news. Since then, journalists have embraced the genre of narrative journalism globally (Keeble, 2012). The prominence of narrative journalism lies in the desire to access free online news, compelling the journalists and editors alike to delve into ways of attracting and capturing the audience's attention and engage them throughout the news story structure (Neven, 2014).

There was therefore need to telling stories that were captivating and engaging so as to retain and engage the audience. This strategy can be witnessed in the recent trends such as ‘‘Slow Journalism movement’’ in which longitudinal and in-depth research characterize high-quality narration (Le Masurrier, 2014). Ideally, the terms New Journalism [Boynton, 2005] and New, Old Journalism (Jonston, 2018) have been used to denote narrative journalism, as seen in the use of anecdotes as news leads. Thus, the objective of narrative journalism has remained to ‘‘immerse readers in real world events and situations and excite them both intellectually and emotionally’’ (Wolfe1978). Thus the media landscape has been revolutionized especially through the onset of the Internet in the early-1990s. Within this new development then, the desire to produce journalistic narratives using multi-media elements has drastically grown. The present study explored how the distinctive features of each of these formats are exploited to immerse the audience in newspaper journalistic narratives using the journalistic narrative techniques such as event scheduling and scene construction thus constitute the independent research variables for this study.

A critical analysis of news narratives in selected newspapers reveal arrange of narrative techniques that are meant to enhance the reader’s experience of being immersed into the story (Van Kreieken 2015). Key among these narrative techniques are scene reconstructions and event structures. In stories where there is no descriptive details about the setting in which the news events take place, careful reconstructions of scenes will be handy in telling the story. Here is an example from the opening paragraph of *The Washington Post* story about the aftermath of the 2007 Virginia Tech shooting:

The wind tore through the valley with icy fierceness Monday, as if nature itself were keening over the unthinkable bloodshed. This, after all, was a place of

promise and young dreams. of futures, not funerals. Across the sprawling campus of Virginia Tech, in the shell-shocked aftermath of the nation's deadliest mass shooting, the wind whipped through the parking lots now filled with police cruisers, and stung the faces of the few students who hurried past with blank-faced determination. [The Washington Post, 17 April 2007]

One would have expected that the lead of this story would summarize the 5wsH of a news, but instead, the story begins with a detailed description of the scene in which the events occurred. This is described as scene construction. Scene reconstructions like this one are meant to jolt readers' imagination about the events in the story such that the readers are taken to the story world and make them partake of or witness the events as they unfold (Van Kreieken 2018). In addition, there is something notable about how the events are structured in this news narrative. The event structures of this news narrative deviate from the event structure of an ordinary news story. The ordinary news story is characterized by an inverted pyramid style or structure where the most significant details of the story are rendered first, then the least important information follows. The result is a non-chronological scheduling of events. This non-chronological scheduling of events spotlights the most newsworthy event. The ordinary news story would present the events in a chronological order in such that the events are presented according to the manner of occurrence. But in the news narrative cited, the events are rescheduled. This rescheduling [scheduling] of events leads to the audience's immersion in the story and creates suspense that holds the readers' interest in the story (Knoblauch *et al.* 2004). Time markers (yesterday, later) and tense markers capture the transition of time in news narratives. Usually the commonly acceptable tense in news reporting and writing is usually past tense (Bell, 1990). However, news narratives frequently use the present tense to bring about the sense of immediacy of the events reported (Sanders 2010). Thus a change in verb tense marks

a change in time of an earlier event on the time frame (flashback). Conversely, the same would be true for a forward flash.

There is also marked variation of viewpoint across scene and event schedules. The viewpoint varies from the rendition of narrator's voice to the demonstration of the narrator's desires, observations, and emotions (Van Kreieken 2017). The indirect mode is generally viewed as being less captivating when compared to the direct mode where the news actor's voice is rendered in a comparably more expressive and authentic style. Consequently, indirect mode subsumes the features of the direct and indirect mode and combines the voices of the journalist and the news source as a result (Van Kreieken 2017). The indirect mode can be traced back to literary fiction and when effectively combined with viewpoint techniques will transform the dimension of news reporting by vividly capturing the voice of characters. The representation of the narrator's voice in news narratives through this viewpoint is important in many ways. The narrator's viewpoint adds both liveliness and truthfulness across the scenes and events scheduled in the story [Clark 1990]. Whether the quotations are narrative-internal quotations or narrative-external quotations (Van Kreieken & Sanders 2016) they add drama and liveliness across the scenes and events of the story as the plot of the story unfolds. These quotations, here described as narrative quotations, capture the speech and thoughts of narrators across news events and scenes of the story. The quotations thus dramatize the story and help to immerse the readers into the story.

Narrative-external quotations portray the speech of news narrators after the news events have taken place. Such situations include for instance at a press conference, court hearing, or interview. Their function in news narratives is to emphasize

truthfulness and accuracy of a news story through demonstrating the where, when, and how the information was collected to reconstruction the events and scenes of the story. Viewpoint markers are thus located near the narrators to depict the subjective viewpoints of news narrators across the scenes and events in a news narrative (Van Kreieken & Sanders 2016). Key among these markers are those linguistic elements that demonstrate a news actor's cognitive state (*realize*), perceptions (the verbs *see* and *notice*), and emotions (the verb, *detest* or the adjectives *scared* or *delighted*).

Journalism has evolved into ways to combining various media formats as a means to creating audience-compelling stories through judicious events structuring and events scheduling. In the eve of the 20<sup>th</sup> century, for instance, technological advancements made it possible for American journalists to venture into audio-visual formats [Good 2017]. Such innovative multimedia renditions were meant to compete with other media formats in movies and magazines. This way, news narratives created a niche for themselves in newspapers.

Then came the advent of the year 2000 which made convergence between the print and online media possible within news organizations (Thurman & Lupot 2017). At first, there were fears that the Internet could spell the downfall of journalistic narration. On the contrary, the new media technologies have ushered in new possibilities for journalists to create scenes and schedule events through multimedia formats (Ray 2013). A multimedia story is now seen as “the presentation of a news story package on a website using two or more media formats, such as (but not limited to) spoken and written word, music, moving and still images, graphic animations, including interactive and hyper-textual elements” (Deuze 2004.:140). Multimedia events structuring and scene construction immerse the audience in the events and

scenes of the story by offering multiple avenues through which to experience story events through structured scenes of the story (Deuze 2004). Experiences of immersion can be realized more by the incorporation multimedia elements. Moreover, for multimedia narratives to be effective, some scholars have argued that the different media formats supplement rather than repeat one another through story scenes and events (Thurman & Lupot 2017). The present study explored how the various narrative techniques such as scene reconstructions and event structures, are employed in the various newspaper news stories and the extent these journalistic techniques communicate science and technology information to newspaper readers.

### **2.6.3 News Narrative Techniques and Non-Expert Audiences**

This section examines news narration techniques and the non-expert audiences. Previous research studies have established a relationship between news narrative techniques and the readers' evaluation (Knobloch *et al.*, 2004; Sanders & Redeker, 1993), effects of such narrative techniques and comprehension (Emde, Klimmt, & Schneider, 2016). The effects of narratives perspective have been witnessed in a number of disciplines such as health communication (McQueen, *et al.*, 2011), advertising (Escalas, 2004), psychology (Crossley, 2000) and law (Brooks *et al.* 2002). A key or recurrent motif in all these studies is that narratives are persuasive: they affect the opinions, attitudes, beliefs, and behavioral intentions of the audience (Braddock & Dillard, 2016). This persuasive power has been attributed to the power of narratives [narrative techniques] in enhancing the readers' engagement with the narrative.

Scholars have developed various models to discuss the persuasive nature of narratives. One such model is the Transportation-Imagery Model (Green & Brock,

2002). In a study on narrative persuasion and transportation (immersion into a story world), Green and Brock (2000) have shown how this transportation plays an important role in narrative persuasion. The writers' argument on transportation borrows heavily from Gerrig (1993: 10-11), who sees this transportation as a voyage by the reader to "some distance from his or her world of origin, which makes some aspects of the world of origin inaccessible". Besides, Green and Brock (2000: 701) see transportation as "a distinct cognitive process, an integrative melding of attention, imagery, and feelings" as well as the "convergent process, where all mental systems and capacities become focused on events occurring in the narrative". This transportation process involves access to the real world, which involves readers' experience of details that are factual in the fictional world created in the narrative but not in the real world. This thus entices readers to appreciate the beliefs and attitudes that are espoused by the characters in these narratives though contrary to their (readers) beliefs and attitudes. To determine the centrality of transportation [as a narrative technique] in narrative persuasion, Green and Brock (2000) designed an 11-item scale to capture readers' attention in the narrative, the readers' emotional involvement, the readers' imagery, the readers' feelings of suspense, and the readers' loss of awareness of their physical surroundings.

Green and Brock (2000) then proceeded with a series of experiments in which participants were subjected to narratives talking about murder of a little girl by a psychic patient on leave. The readers were asked to complete the transportation scale by marking their levels of perception with the items based on their values and judgement of the characters in the narratives. The results strongly suggested that the readers of narratives who were more engrossed in the world of the narrative reported more consistently and strongly held beliefs when compared to readers who were

rarely engrossed in the world of the narrative. Specifically, readers who demonstrated more transportation into the narrative were more predisposed to the idea that psychiatric patients needed some form of restriction in one way or another.

Having been introduced in the year 2000, the Transportation Scale extends to studies on reading experiences and the effect of these experiences on narrative persuasion (Mazzocco, Green, Sasota, & Jones, 2010; Murphy, Frank, Chatterjee, & Baezconde-Garbanati, 2013; Johnson & Rosenbaum, 2014; Johnson, 2012).

In the context of journalism studies, Oliver *et al.* (2012) used the Transportation Scale in the study on the persuasive effects on news narratives. The writers have presented the subjects of the study with a news narrative detailing health care issues for marginalized groups or populations (immigrants, prisoners, elderly persons). In every article, both narrative and non-narrative formats of the story were generated. In the non-narrative stories, the health care motif was presented in line with a given policy which included expert quotes. Conversely, in the narrative versions, the motif was presented through the experiences of a specific person. After reading either the narrative or non-narrative formats of the story, the participants' level of transportation into the story world; the readers' associative reactions; empathic attitudes; intentions to help the target group; and information seeking behavior were all determined. The results indicated that narrative formats resulted to more empathic attitudes, a trend mediated by higher compassion. Empathic attitudes on the other hand determined the participants' dispositions towards helping a target group, which ultimately influenced their behavior related to information seeking. The narrative format stories also demonstrated higher transportation. Besides, transportation was positively correlated both compassion and behavioral intentions. From this study, it can be argued that

narrative news articles were found to be more engaging and persuasive when compared to the non-narrative news articles. Hence, the reason why the current study focused on journalistic narrative techniques as opposed to non-narrative techniques in communication of science and technology information to non-expert audiences. The current study however did not include transportation as a narrative technique, but focused on narrative viewpoint, scene construction and event schedules, which are all independent variables in the current study, but not discussed in these studies.

In another study, Shen, Ahern, and Baker (2014) examined the impact of the news narratives on scientific endeavours such as the shale gas drilling. The writers used the shale gas drilling as a scientific concept. They presented the participants with narrative or an informational news article on shale gas drilling. The narrative format story included a family affected by shale gas drilling and was rendered in a chronological order. The informational format narrative included results from scientific studies on shale gas drilling but rendered in an inverted pyramid structure. Comparing participants in both situations, the writers established that the participants who were exposed to the narrative story demonstrated more empathy, more cognitive responses related to gas drilling, higher levels of transportation, and less favorable attitudes towards gas drilling. The effect on attitudes was moderated by empathy and cognitive responses, as opposed to transportation. The two studies cited therefore suggest that stories in narrative form are likely to be more persuasive than non-narrative news stories, although the persuasive effects were in only one of the studies based on the readers' transportation into the narrative world. These results, though mixed in their findings, suggest the use of Green and Brock's (2000) Transportation Scale.

The 11 items of this scale were largely perceived to be in unidimensional scale, though other studies have demonstrated that the scale comprises of multiple dimensions (Slater, Rouner, & Long, 2006; Oliver *et al.*, 2012). This multiplicity of dimensions demonstrates the process of immersion in a story is very complex and that it requires not only emotional, but also cognitive dimensions. It has also been consistently demonstrated that this trend can assume different formats for instance, Oatley (1999), explicitly distinguishes between two different positions available to people reading a story. Foremost, people experience the story events from the perspective of a “spectator” who exists in the narrative world as an “unobserved observer”. This situation communicates passivity. Secondly, people can interact with the story events from the perspective of the mind and eyes of one of the characters in the story. This perspective is more involving since people may assume character’s viewpoint and goals.

Elsewhere Boyd (2009) has shown how readers can either take an observer or what he calls a field position when experiencing a narrative. In this case, readers in an observer position will see the narrative events and characters from an external viewpoint, whereas readers in a field position experience the same events through the internal viewpoint of a character (Nigro and Neisser, 1983). From the foregoing discussion, the Transportation Scale cannot therefore differentiate between these different types of reading situations. Consequently, is therefore not likely to demonstrate a comprehensive treatise of the nature of the audience engagement with a narrative alongside its characters. In exploring the narrative techniques, the current study finds the multidimensional concept of narrative engagement useful in evaluating the success of narrative techniques in communicating science and technology to audiences who may be considered non-expert.

Busselle and Bilandzic (2009) have introduced the concept of narrative engagement to capture the various cognitive experiences that are realized while reading a narrative. The scholars discuss four distinct types of narrative engagement. The first type is described as *narrative presence* which focuses on the reader's experience of exiting the real world and entering the narrative world. This is a phenomenological experience entails a deictic shift, meaning that any connotations to the environmental situation (references to persons, time, and place) are no longer discussed in relation to the real world, but in connection to the present situation of the narrative world (Segal, 1995). Readers thus "shift their deictic center from the real-world situation to an image of themselves at a location within the story world" (Segal, 1995: 15). The second type described as the *emotional engagement*, describes the affective alignment with the story's character and the emotions aroused by the nature of the story. This dimension is related to the notion of identification. In any case, there are different perspectives to identification (Brown, 2015), and that a cognitive process to identification is considered one in which the reader takes up the emotions as well as the perceptual and cognitive viewpoint of a character such that the reader experiences and appreciates the narrative events from this character's viewpoint (c.f. Moyer-Gusé, 2015). In a nutshell therefore, identification will involve seeing and experiencing the narrative events based the subject's eyes and ears.

The third aspect called the *Attentional focus*, involves an intense focus on the narrative. This dimension makes reference to a situation where the readers step away from their terrestrial surroundings where their concentration is unaffected by events attendant in the real world. This is described as "getting lost" in a story (Nell, 1988). Busselle and Bilandzic (2009) contend that this state of intense involvement continues to remain unexplored to a point where the readers become distracted and re-energize

their focus on the story. The fourth dimension described as *narrative understanding*, entails the reader's understanding of the narrative and its events. When compared to the other three dimensions, narrative understanding contributes relatively less to narrative engagement. Besides, a lack of narrative understanding is described as having a negative effect on readers' engagement. Such that, if readers fail to conceptualize a narrative, for instance, how events relate to each other, then ultimately their engagement with the narrative will be disconnected. For instance, news narratives about criminal acts are thought to put readers in the position of mediated witnesses to the criminal acts (Peelo, 2006).

Consequently, a mediated witness experience is said to comprise of two aspects: the virtual experience of a crime in real time and the emotional engagement with eyewitnesses to that crime. This idea is consistent with the understanding of narrative engagement as a multidimensional phenomenon. This corresponds with the results of empirical studies that corroborate the fact that readers' engagement with a narrative is indeed a multiplicity of concepts and dimensions. The concepts narrative presence, identification, emotions, and attentional focus have been found to be distinct aspects of narrative experience (De Graaf, Hoeken, Sanders, & Beentjes, 2009, 2012). Although the present study does not venture into the effect of news narratives on various aspects of readers' engagement, this discussion is useful when examining the use of journalistic narrative techniques in news stories to engage with non-expert audiences on matters science and technology, which is part of the proposed study.

#### **2.6.4 Communication and Accessibility of Scientific and Technological Information**

Scholars in the realm of science communication have paid much attention to certain aspects of the communication and accessibility of scientific and technological information by emphasizing on specific variables such as, though not limited to, accessibility of such information, the validity of the scientific and technological information, the non-expert understanding of such information and how the communication of technological and scientific information resonates and engages the non-expert audiences. The current study of the view that not many studies have attempted to provide a framework that focuses and analyses on how journalistic techniques can be utilized to communicate high-quality scientific and technological information effectively to non-expert audiences. For instance, Seethaler et al. (2019) in their elaborate study discuss a wide range and universe of ethical variables and values underlying and promoting efficacy in scientific and technological communication. On another level, Mercer-Mapstone and Kuchel (2017) have explored and analyzed twelve (12) critical vehicles and catalysts for enhancing the communication of scientific and technological information among citizens though not necessarily non-experts. The study by Mercer-Mapstone and Kuchel, especially when taking into account the views emanating from the citizens during the period of consultations during focus group discussions, paints a vivid picture to an understanding of science and technological communication where the identified variables and sub-variables support each other, but at the same time imply that a whole plethora of variables and their use enhance science and technology communication delivery. Using the Mercer-Mapstone and Kuchel framework, critical aspects of the citizens' science and technology communication improvement

framework that were identified and analyzed. However, the framework provides only a snap-shot which can be contextualized only in the communication of science and technology information to citizens although the contextualization of such citizens as expert or non-expert is not defined in the study. What the study however raises are that accessibility of scientific and technological information is very critical and a major consideration in studying science and technology communication.

Science and technology communication seems to appear two- fold. At one instance it appears science and technology communication is about ensuring as much as possible that the largest of the audience populace not only have access to science and technology information without any restrictions and that such information is easily understood and applied to their situation and information needs. On the second level, the effective and efficient communication of science and technology information is geared towards and realizes social inclusion (Matias et al., 2021). It is therefore imperative to note that the media [in the context of this study print media] provides ample opportunities and space such that the scientific and technological knowledge can be shared at individually and collectively and thus sustaining elaborate access to and use of science and technology information to realize audience engagement and sustainability. The studies have devoted to the analysis of the exposition of science and technology information in the media, though largely scanty in print media, depicting that the reportage and rendition of science and technology in newspapers continues to increase over the past few decades (Bucchi & Mazzolini, 2003). However, there is constant need and increased audience need to advocate and sustain the increased accessibility and use of science information to the public in general especially the non-experts so as to make such information easier to access and use by all those actively looking for it. Even with the audience less interested in science and

technology, accessibility is key just as audience engagement. The communication of science and technology information needs to focus on this passive segment of the non-expert audience. The media, especially newspapers have a critical role in enhancing the visibility and communication of science and technology, and its role in society. For this reason, therefore, there is need to communicate science and technology in a manner tailored to different audiences including the non-expert ones. Finally, scholars have urged for the need to communicate science using an understandable language tailored to different audiences. In other words, communicators need to ensure that their messages are understandable with the final public in mind implementing different strategies, such as more adept use of visuals or data (Bucchi & Saracino, 2017; Rigutto, 2017; Delicado & Rowland, 2021). The idea of the validity of science information is directly connected with a specific assumption that any science communication needs to take into consideration the audience, especially the lay public, who are going to access and use such information. This way the accessibility and use of information on science and communication can be enhanced.

Closely connected to the concept of accessibility and communication of scientific and technological information is the validity of information being communicated or shared. Validity as a variable in science and technology communication has a direct correlation with the way the public consumes the information. For instance, increasing the volume of availability of scientific and technological information through print media especially newspapers, increases the validity of that information since journalists work with researchers and experts to validate and verify the information. Consequently, the scientific and technological information which most likely gain a higher degree of the social acceptance of science and thus spurring future

scientific and technological innovation (Hilgartner, 1990). Hilgartner, (1990) contends that the underlying motif of any science and technology communication has been that the information communicated is valid and reliable enough to the audience and other experts especially science and technology experts so as to initiate future discourse and generation of innovations thus increasing and expanding the cycle of generation of scientific and technological information. Hilgartner opines that this is the essence of science and technology communication. The writer however does not mention the plight of the non-expert in the consumption of that information and does not limit the communication of that information to journalistic narrative techniques employed in newspaper news stories. This area of focus of the current study. However, the writer's (Hilgartner, 1990) argument about validity and accessibility of scientific and technological information and how the two are ensured in science and technology communication are critical to the current study.

Fundamental to any discourse about science and technology communication is the sustenance of validity in science and technology communication. Concerns have been raised on how validity can be ensured as efforts in communication are made towards engaging the non-experts in consumption of science and technology information. Some scholars in science and technology communication (Weingart and Guenther ,2016) have observed that science communication must be built on strong foundations of trust, not only on the side of communicators but also in the communication vehicles used to deliver the science and technology messages. This consideration of trust in science and technology communication is a derivative of the more recent anti-science and technology communication viewpoints. These dissenting views are worth considering in any discourse around science and technology communication. Scholars notably Vernon, (2017); Crease, (2019), have been cited in their commentary on anti-

vaccination views, dissenting voices on climate change, their resentment on the promotion and use of medicines not based on scientific evidence and so on have been advancing opposing views on science and technology communication. Thus, issues of lack of trust in the science and technology information communication result into far-reaching consequences. The issue of serious threat to the health of people and more so millions of people and to the safety of the environment across the globe have been raised already (Douglas & Sutton, 2015). The emerging lack of trust or cynicism to science and technology information has been attributed and understandably so to the specific information sources and channels, and not forgetting the proliferation of social media channels where everybody appears to be an expert in matters science and technology and that the users of such media are unable to determine the skills of the people sharing such information. Add this to the trend in recent times across the various social media where we have witnessed the spread of fake news, misinformation, disinformation and malformation; all of which have had an impact on the information being shared and the audience receiving, accessing and using this information. Whereas the current study does not focus on trust and how it is ensured in the communication of science and technology information, the element of trust is critical as it develops from the validity of information being communicated to non-experts who themselves are unable to ascertain validity in science and technology communication in any context.

Scheufele and Krause (2019) have touched on the issue of misinformation and connected it to the audience's inability to point out the attendant falsehoods in the messages. The writers argue that this misinformation is fueled by the ordinary people's ability and capacity in terms expert skills to point out falsehoods and their vulnerability in the face of misinformation. It is in this connection in the recent times

that fact- checking sites and strategies aimed at addressing science and technology misinformation have been initiated. In the wake of growing misinformation (Schiele, 2020; Allcott & Gentzkow, 2017), the experts, that is scientists in collaboration with journalists have proposed ideas on content duration which is geared at verification of information such that the public especially the non-experts have credible information (ALLEA, 2021). Some of the measures that have been put in place include certification measures and public education campaigns geared towards emphasizing the significance of science and technology. In addition, some public institutions and civil society organizations have been tasked with the responsibility of checking misinformation, disinformation and malformation (EC, 2020).

## **2.7 The Deficit Model and Communication of Science and Technology**

Initially, the deficit model of the communication of science and technology was premised on the idea that synthesizing scientific and technological information is exclusive and a preserve of the scientifically and technologically literate populations and that perpetuating this trend would ensure that favourable responses to scientific and technological information. This deficit model has been built on the public's inability to comprehend and evaluate scientific and technological information. Scholars have suggested ways of addressing the deficits in the earlier model such that public and private institutions especially have initiated measures to advance public interest in and full awareness of science and technology communication in society. The early model of science and technology communication herein described as the deficit model dating back to the early 1990s, has some of its assumptions criticized these assumptions (Evans & Durant, 1995; Wynne, 1991). However other studies have found out that that scientific and technological literacy are connected with

positive dispositions towards science and technology (Sturgis & Allum, 2004; Rutjens et al., 2018). In this study, however, the deficits in the model deny the non-expert audiences of the opportunities to understand and process scientific and technological information. This unfairly excludes the non-experts from accessing, using and applying scientific and technological information. Since information needs to promote inclusivity in society, then this exclusion denies non-experts their fundamental rights to information. Moreover, the non-experts through the support of experts and the media require the relevant and exquisite skills to understand and apply science and technology information, the capacity to determine its validity and the identification of its relevance to their respective situations. To effect this, some scholars have suggested the development of science and technology literacy and critical thinking skills public and civil education programmes in order that society and in particular the non-experts are better placed to evaluate and make sound decisions between credible information and the false one (ACARA, 2015).

Given the increased knowledge and skills on the part of non-expert audiences, the audiences are better able to put the information acquired into their own experiences and subsequently apply it in their own individual and collective situations (Cook et al., 2011). This explains why in recent times there been calls for elaborate and structured involvement of lay people in science and technology by enabling lay people determine and take control of their information needs. This trend necessitated the involvement of the lay audience, here in this study described as non-experts, in the current study. This also forms the basis of conducting a study on the communication of scientific and technological information. However, the current study took a different dimension by focusing on journalistic narrative techniques in newspaper news stories. Consequently, the current study initiates and sustains new efforts

towards the discussion on the place of the public communication of science and technology.

Given that the old mode, the Deficit Model, has been found wanting based on the short-comings identified, a new model has been proposed. In the turn of the new millennium, the UK House of Lords identified a new model which they described as 'New Model for Dialogue'. Other scholars and institutions joined hands towards reviewing review existing strategies in line with the current discourse and the gap that science and technology communication is addressing (Bucchi, 2008).

New models of science and technology communication, notably, those emphasizing dialogue and participation, have appeared since the turn of the new millennium. In line with the emerging trends is the concept of the citizens' engagement of society with science and technology. Scholars (Cook et al., 2011) in this case have called for narrowing the gap between science and the public at large, by emphasizing that science and technology need not an intellectual orientation undertaken in an exclusion, but involve a collaborative effort by all stakeholders including the media so as all can be reached including non-experts based on the existing information needs.

In the new model, New Model for Dialogue, scholars have suggested a number of strategies that that are likely to enhance direct interplay between scientists and society such as initiating avenues for that promoting dialogue between lay people and specialists specialists, experts or scientists so as to seek explanations or to broaden the lay people's knowledge of themes of interest on matters science and technology (ACARA, 2015). The model also discusses the levels of the involvement of lay people in playing an active role in science and technology- related ventures. This is what has been described as engagement (Bucchi & Saracino, 2017; Rigutto, 2017;

Delicado & Rowland, 2021). Audience engagement is particularly central to the current study especially on the use of journalistic narrative techniques to communicate scientific and technological information to no-expert audiences. However, the model does not make reference to use of journalistic narrative techniques and newspaper news stories, but the lay people engagement with matters science and technology in the New Model for Dialogue is central to the current study

In addition, the New Model for Dialogue presupposes that engagement of lay people with science and technology is more likely to subsume lay people's knowledge, solidify trust and induce new dispositions and behaviour. This works well in subjects such as climate change, where lay people feel their concerns and experiences especially the local experience in science and technology communication is not only positive but highly transformative for science and the lay society-stakeholder relationship. This relationship is likely to be limited by location or nationality since the ideas relating to science and technology have a universal application. The model also mentions the use of the media notably the television use of television to reach a wider public in a more impactful way subsuming public authorities and experts in verifying and certifying available information; the centrality of scientists who are actively included in communicating scientific and technological findings; reaching out to the media which in turn is directly involved in communicating science and technology to the public with the public. The inclusion of the mode in this model is relevant to the current study especially in its use to communicate with the lay people on matters science and technology. However, the only media mentioned in the model is the television because of its ability to combine pictures and messages such the overall communicative ability is higher compared to other media. The current study takes departure by focusing on the newspaper as a medium which has the luxury of

space to experiment with a variety of journalistic narrative techniques in news stories unlike in television news stories limited by airtime and depth of coverage

Apart from the media and its personnel, the model mentions the science and technology practitioners. The model suggests that science and technology practitioners are central in communicating scientific and technological topics to the public since the practitioners are in constant touch with public through the relay of scientific facts. Besides, the experts are endowed with credible information. This is what some scholars have described as communality in dissemination of scientific and technological information (ACARA, 2015; Delicado & Rowland, 2021). This communality is essential in terms of science and technology communication and the lay people's access to science and technology information. The model discusses the challenges experience in communication of science and technology especially from the perspective of the experts. Some of the challenges relate to the fact that some aspects of science and technology information were renders differently and variously. Such aspects relate to, the suggestions on verifying scientific and technological information, certification or recognizing science and technology content through legislation, and the attendant health risks health risks associated with the communication of false information in some contexts. For example, the model cites the use of generics over conventional medicines in the treatment of certain ailments where the choice of generics over conventional medicine is more likely to pose a risk to people's health and lives. This then requires that the relevant experts divulge the relevant information to this which in turn require validation of existing to this end. Although the model does not mention it, this is where the journalists come in to present the information that the experts might be reluctant to divulge to the lay populations This therefore means that there is more to be done to improve the

effectiveness of communication in science and technology, especially taking into account the fact that the lay people's may at times influenced by the opinions of family or friends and not the scientific evidence. This situation thus underscores the significance of validation for science communication especially on vaccines on vaccines where a collaboration of various stakeholders is critical in social campaigning and government involvement so as to ensure credibility and trustworthiness of science and technology information is ensured.

The model stresses the direct involvement of citizens. This is a situation where which citizens, in the context of this study, lay people r non-expert audiences are directly involved, actively taking part in and gaining and learning new habits, as well as contextualizing the consequences of their actions in relation to their own situations or locality (Dzimińska et al., 2021). This is where the media especially local media comes to contextualize and keep the lay people in the vicinity of science news. In all five countries, the older participants preferred the former, while the younger ones opted for the latter. The communication of science and technology however requires a consideration of quality versus quantity. This affects the laypeople's perception This difference is also seen in the perception of the quantity/ quality of the science and technology information they access. The model thus suggests that the choice of the medium to relay scientific and technological information is key. The current study settled on the newspaper since the newspaper is able to address both quality and quantity of information require. Where more information is required the newspaper is better placed to provide it due to the luxury of space unlike radio or television.

## 2.8 Review of Previous Research Studies

Melinda *et al* (2018) conducted a study on comparing mediational pathways for narrative- and argument-based messages in terms of narrative believability, counterarguments, and emotional reaction. The gist of the study is that narratives proved to be more superior in argument-based messages in certain situations because of their propensity to impose a unique effect courtesy of the particular mediational pathways. The study incorporated three sets of cognitive mediators (believability, counter-arguing, and emotional reaction) of the relationship between message modality (narrative- vs. argument-based) and the outcome of purchase decisions. Respondents (N =214) were randomly asked to view one of four advertisements from two brands containing narrative or argument-based messages and indicated their measures of purchase decisions, believability, counter arguing, and emotional reactions to the advert.

Based on hypotheses of the study, Melinda *et al* found out that narratives increased intentions to purchase as compared to non-narratives. The authors also found out that single moderated mediation models were associated with the mediating contribution of the absolute dimension of believability, counter-arguing, negative and positive affective reaction. Adopting a combined moderated mediation model, the study findings gave further credence to the existence of a positive effect as a mediator. Results put forward evidence to support several tenets of mechanisms of narrative persuasion and consequently illustrate an approach used to evaluate multiple mediators in comparative message research. Melinda *et al* study compares narrative and non-narrative messages and their effect on emotional reaction towards an advert based on believability, counter-arguments. The current study did not consider non-

narrative messages since such messages are outside the scope of the study. Secondly, although the narratives utilized by journalists in this study may influence some emotional reaction on the non-expert audiences, the current study did consider the mediating variables or pathways discussed in Melinda *et al.* The current study was not about purchase intentions, but on how narratives as a mode of communication can be utilized to communicate science to non-expert audiences. Thirdly, Melinda *et al.* used a sample size of 214 (N=214). The current study used a census. A census is also justified since the current study was not conducted in a controlled environment just as Melinda *et al.* did.

Elizabeth & Kellas (2018) did a study titled *Sense-making, Socialization, and Stigma: Exploring Narratives Told in Families about Mental Illness*. The study which was based on Communicated Narrative Sense-making Theory (CNSM), delved into mental illness (MI) narratives rendered in families and the lessons learnt from these narratives by young people. The results from individual, semi-structured interviews with young adults (N = 24) revealed that family members, notably parents, exchange stories about the MIs of individual family members and that these stories reflected motifs of struggle and caution. Respondents confirmed learning important lessons from these MI narratives and that these lessons included MI awareness and importance of understanding MI. Findings demonstrate dimensions in which family narratives about MI teach younger members lessons and expectations for managing MI irrespective of prevailing MI stigma. The researchers found out that the relationship between the grandparents and their grandchildren can be reinforced by sharing of narratives, since the sharing of these narratives demonstrates important family values and beliefs since support is a critical attribute in the grandparent-grandchild relationship. The researchers conclude that the narrative sharing is

perceived as an additional support and that grandchildren's levels of satisfaction in the relationship as a whole is subject to variation. Limitations, future directions, and implications for narrative interventions as intervening variables are equally analysed.

This study helps to build support for CNSM theory's (Koenig Kellas, 2018) propositions surrounding the effects of story sharing on health and well-being outcomes. This study entails evidence that retrospective narratives determine the feelings based on health and knowledge, and compliments other studies that continue to examine the relationship between family narrative rendition and perceptions about health. However, the proposed study is not on family communication but on scientific communication and on narratives as a medium for communicating scientific information to non-expert audiences and not family members. The current study was grounded on narrative theory based on the structuralist, functionalist and discourse analysis approaches as already discussed in the previous section. The sample size for the current study was higher than that used in Elizabeth & Kellas (2018), N=24, since the current study was not conducted in a controlled environment where the effect of extraneous variables is controlled for. The current study was conducted in a natural geographical set up likely to encounter the effect extraneous variables hence a census to provide data on these variables.

Dahlstrom and Rosenthal (2018) examined the impact of narrative and emotion on processing of messages by African American breast cancer survivors. The study made use a bi (narrative: present/absent), tripple (emotional valence: pleasant/ unpleasant/ mixed), quadrapple (message repetition) subject inclusive experimental design. Findings showed that narrative messages containing *pleasant* and *unpleasant emotional content* (mixed framework) displayed the highest attention (what the

scholars describe as *heart rate deceleration*) and negative emotional response (described as *corrugator supercillii*) whereas unpleasant narratives displayed the lowest. However, non-narrative messages displayed the converse pattern of results in which unpleasant messages displayed the highest ranked attention and the highest ranked emotional response, but non-narrative messages with mixed emotional content displayed the lowest ranking. These results underlie the conclusion that attention for narrative content depends on the prevalence of emotion displayed in the message, which has both theoretical and practical inclinations.

Foremost, Dahlstrom and Rosenthal study is on health communication measuring the impact of narratives on processing of messages narratives by breast cancer survivors. The current study was on science communication, not on measuring impact of narratives, but on how journalists utilize narratives to communicate scientific information to non-expert audiences. The current did not adopt the experimental design like the study under review; instead, it adopted a survey to underscore how journalists currently use journalistic narrative techniques to communicate scientific information to non-expert audiences. Besides, the narratives that were selected for the study are those that contain the independent variables for the study, which is scene construction, event structures and viewpoint techniques and not those with emotional valence such as pleasant /unpleasant/mixed messages. Consequently, narrative valence and emotional response are variables outside the scope of the current study.

Fioretti, *et al.* (2016) study reviews narratives in medical research studies involving patients' and their caregivers' perception of illness experience. *MEDLINE*, Psycinfo, *EBSCO* Psychological and Behavioural Science. Using database search by focusing on *The Cochrane Library* and *CINAHL* databases, the study endeavoured to identify

all the research studies that touched on the Narrative Medicine Approach as captured in the title, in the abstract and in the keywords the words 'Narrative Medicine' or 'Narrative-based Medicine'. Primary and secondary outcome measures such as number of participants, type of disease, race and age of participants, type of study, dependent variables, intervention methods, and assessment were considered. The results of the reviews revealed that of the 325 titles screened, only 10 research articles fitted the inclusion criteria. The systematic review established that the study on Narrative Medicine cannot be attributed to any common methodology: narratives in the medical field are used as an interventionist measure and as a tool for assessment. Patients' characteristics, types of disease and data analysis procedures differ among the screened studies. The study therefore concludes that Narrative Medicine research in medical practice needs to find clear and specific protocols to deepen the impact of narrative on medical practice and on patients' lives. It may be noted that the study recommends first a critical evaluation of research studies in medicine undertaken within a Narrative Medicine methodology. Besides, a critical analysis was undertaken to evaluate scientific evidence in the field beginning with the first publication on Narrative Medicine. Consequently, based on the narrative nature of data, it is difficult to implement a meta-analysis of the selected studies. The study under review is qualitative adopting content analysis as a research design and focusing on selected qualitative data. The proposed study adopted a quantitative approach and a descriptive survey design and collected quantitative data, which was analyzed to determine the relationships between the independent variables and the dependent variable. Lastly, the current study was on science communication and not on health communication. However, both studies converge on the narrative as a medium of communicating science related information although the audience is different.

Igartua & Fiuza (2018) focus on analysis of the factors that can increase the persuasive effectiveness of information campaigns using narratives. An experiment was undertaken in which similarity with the protagonist was investigated in a video about a victim of gender violence. The villain was presented as living in Spain, and she was said to be Spanish (high similarity) or Argentinian (low similarity). The respondents (75 Spanish women) were subjected to a questionnaire with variables on emotional impact, identification with the protagonist, and risk perception about becoming a victim of abuse. Results indicated that similarity with the villain has an indirect influence on risk perception through negative emotions and identification. The study under review, just like the proposed study, adopts a quantitative approach, which requires quantitative data that is eventually analyzed through descriptive and inferential statistical techniques. However, the current study did not conduct factorial analysis nor adopt the experimental design as done in the study under review, but considered aspects of the narrative such as their ability to influence change and efficacy in communicating the desired messages. Equally, the protagonists in each narrative were only considered in line with the variables such as scene construction, event structures and viewpoint techniques, which are all independent variables in this study.

Downs (2014) describes how a narrative approach to science communication may help audiences to more fully understand how science is relevant to their own lives and behaviors. The adoption of descriptive scientific narrative is more likely to address the complexities related to scientific ideas for example the need to challenge long-held values based on the emergence of new research findings. According Downs, narrative can hook the audience and foreshadow plot and conflict resolution, thus becoming an impetus to personal motivation towards information delivery. This

aspect, according to Downs, assigns the narrative immeasurable potential to unravel complex issues and causal relationships and to generate and emphasize memory trails to enhance recall and application across a period of time. Based on the attendant characteristics of narrative communication, the narrative creators owe their audience additional responsibility to ensure careful selection and rendition of the relevant scientific evidence. The current development in communication and information technology comes along with new avenues for disseminating content based on their available interactivity, which can make use of their attendant user friendly tools to help individuals get the intended content in real time and situation. Based on the previous experience from education and learning, prescriptive scientific narratives need to be studied and analyzed systematically to ascertain their potential in promoting understanding and modifying behavior. In the paper, Downs delves into the mechanisms of delivering scientific findings through well-crafted science narratives coherent enough to make complex ideas look more user-proximity, intuitive, and enable recall in real time. Downs is a paper published on how to structure narratives to effectively communicate science to the desired audience. The current study did not seek to structure narratives but focused on narrative techniques, which have been used by journalists in newspaper news stories so as to determine how the narrative techniques are utilized to communicate science and technology with the non-expert audiences. Downs paper was useful in understanding narrative structure from a structuralism point of view and function from a functionalist approach, which are all approaches discussed under narrative theory.

Coker and Kizito (2018) have conducted a systematic review of the literature on specific air pollution epidemiological studies that have been undertaken in Sub Saharan Africa by 2018. The review of the literature, according to the writers, focuses

on epidemiologic studies that estimate air pollutants and correlate the identified air pollutant measurements with specific health outcomes. The writers identify the gaps related to air pollution epidemiological studies undertaken in different regions of sub-Saharan Africa and argue a case for studies in methodological, environmental and epidemiology studies addressing specific air pollution in the region. Coker and Kizito paper is a narrative review of literature on air pollution from epidemiological perspective, and not necessarily on communication. The paper is a demonstration on how narration can be used as a mode for communicating science on air pollution on various studies conducted in Sub Saharan Africa. The paper however does not provide primary data to support the conclusion drawn concerning the existing gaps in air pollution in the epidemiological studies reviewed. The current study however sought to collect primary data, analyze it and draw a conclusion on the utilization of narratives by journalists to communicate scientific and technological information to non-expert audiences.

Mutisya (2013) conducted a study in which she analyzed the language employed in literary journalistic articles and the literary styles thereto. The specific objectives were to; to investigate the structure of literary journalistic articles in the Daily Nation and the Standard newspaper; to find out the narrative techniques in literary journalistic articles in the Daily Nation and the Standard newspaper; and to compare narrative techniques in literary journalistic articles in the Daily Nation and the Standard newspaper. The study employed social construction theory to enable readers construct a reality from the language and narrative techniques employed in literary journalistic articles. Based on the descriptive design, qualitative data was collected. Content analysis was used to select and analyze the collected qualitative data. The study established that literary journalistic article writers have a diction as well as specific

tone. Based on these findings, one can conclude that the words used by journalistic narrative creators render their work distinct from other genres of journalism. The study recommends that literary journalism writers make use of photos and pictures to enrich their narratives. The study established that identified dialogue, satire, shifts of time and symbolism as some of the most common stylistic techniques used by writers to create humor and captivate readers. The study also found out that these devices are also used to satirize follies and individual vices in the society. Foremost, Mutisya study though in Journalism and samples Kenya's two leading newspapers, *The Nation* and *The Standard* focuses on opinion articles and not on news stories. Besides, the study does not limit itself to any particular beat or subject matter but focuses on opinion articles on narrative in terms of their structure, their prevalence and comparison of use in opinion articles. Moreover, the audience for such articles has not been defined, whether expert or non-expert. The study is purely qualitative relying on textual analysis to analyze qualitative data. The current study takes a departure by focusing on all the four Kenyan leading newspapers. The current study specifies the beat of the news stories under focus, that is science and technology, and, therefore, does not deal with opinion articles but news stories. Moreover, the audience for the selected newspaper content is specified as non-expert. The current study uses both qualitative and quantitative data and the mixed methods approach unlike the study under review.

Khisa *et al* (2017) use narratives to document the experiences of women with fistula illness. Based on the grounded methodology theory, narratives based on labour and childbirth were selected through purposive sampling to raise a sample of 121 patients with obstetric fistula from 3 hospitals in Kenya. Narratives were analyzed based on a three-pronged parameters: Interaction, Continuity and Place. The study identified six

recurrent themes that predict the frequency of occurrence of fistula. These recurrent themes were: people who procured labour process (interaction); the amount of time spent in labour; the birth outcomes for baby (continuity); mode of delivery; referral of women in obstructed labour; and place of delivery. The study concludes that the findings are relevant in the establishment and application of a midwifery early screening intervention for fistula care in Kenya. Khisa *et al* is a study in midwifery published in the Journal of Midwifery and Women's Health, but utilizes narratives to document experiences of women affected by obstetric fistula in three Kenyan hospitals. The affected women who are not journalists utilize the narratives and the experiences are narrated to specialists, that is, obstetricians, and not a non-expert audience. Besides, the variables on which data was collected are different from those in the current study.

Ligaga (2017) revisits a familiar format of the moral narrative and uses it to narrate stories of (especially) women in the public sphere in Kenya. Focusing on a wide of media texts, the writer establishes a pattern of rendition that is traceable to a recognizable genre of the moral narrative and employs this genre to establish a corpus of narratives grounded on gender and sexuality in Kenya. The sample narratives are obtained from a popular radio drama program and also from popular press reports of wayward women. The article also employs counter-narratives generated from popular socialites namely Vera Sidika and Huddah Monroe who, based on the motif of near nudity in public platforms, initiate a counter-reading of discourses based on gender and sexuality in the Kenyan social media domains. The writer concludes that this article extends the boundaries for reading popular cultural forms established within generic constraints and invites to reflect on the essence the counter-readings have in our reading and understanding of gender and sexuality in Kenyan narrative literature.

The study under review is relevant to the proposed study in the sense that it studies narrative as a discourse or text for and against gender and sexuality. The current study too looked at a narrative as a text and discourse but based on the narrative theory from a structuralism and functionalism perspective. This way the study focused on narrative techniques utilized by journalists to communicate scientific and technological information to non-expert audiences. Ligaga's study is content analysis, while the proposed study was a quantitative approach as the dominant paradigm and qualitative approach as the minor paradigm to the study of a narrative within science communication.

Odengo (2018) examines the role of four community-based radio stations (West FM, Radio Mambo, Mulembe FM and Sulwe FM) in communicating health care information to the rural women in Kakamega County so as bridge the gap of poor or limited access to healthcare information services. The study was specifically based on the following objectives: to determine the basis and rationale of information programming in the four community-based radio stations in Kakamega County; to examine the relevance of their health-related programs; and the perception of the women on the existing radio-based health care information aired by the four community-based radio stations in Kakamega County. The study was based on the framing theory. Besides, a mixed method research design was adopted encompassing both qualitative and quantitative survey among women. In addition, a qualitative analysis of information on the radio health-related programs was conducted. The study population comprised of 53 personnel from four radio stations and 355,000 women aged between 15-49 in Kakamega County. The sample comprised of eight persons selected from four radio stations and 400 women listeners. Semi-structured

questionnaire and interview schedules were used to collect data from the female listeners and key informants respectively.

Quantitative data was analyzed using Statistical Package for Social Sciences (SPSS) tool. Content analysis of qualitative data was effected through the use of *Atlas ti.8*. Quantitative results were rendered as frequencies, mean, and standard deviation all presented through text, table, bar chart, graph and pie chart formats. Qualitative findings were categorized into common themes and categories then presented in text or narrative formats. The findings reveal that women, a significant aspect of the audience in this study, are lacking in the design of content for specific programming at the four community radio stations sampled even though (77%) of the women agreed that they had been found to be having a better perception of health issues. The radio stations communicate health- related information that educates and entertains their audience. Nonetheless, the content is devoid of evidence and context. Majority of the women segment thus remains neutral on whether the radio health programmes have transformed their perception about health programs and information related to these programmes. The study thus recommends the involvement of women in the program design; undertaking of periodic research to establish the women perceptions of the programmes with a bid to generating evidence-based and context-specific programming about women in Kakamega County as a means of increasing uptake of healthcare services. This research provides a background upon which strategies for dissemination of health care information are grounded to enable the uptake of such services by women can be implemented. The study is also conducted within the realm of science communication, just like the current study.

The study under review also uses a mixed approach, which resulted to both quantitative and qualitative data. Unlike the current study, Odengo (2018) uses a large sample size to generalize the sample findings on the population. The study under review however does not refer to narrative techniques in communicating health related information to the mass audience that the community radio stations serve. Although Odengo (2018) indirectly suggests that sample findings are generalized on the entire population based on the summarized research findings, the study does not employ inferential statistical techniques to do so. The proposed study will employ inferential statistics to establish and generalize the narration techniques that communicate science and technology information to non-expert audiences.

Otieno (2008) conducted a study on Kenya Government Health Communication: An assessment of intervention communication on bird flu. This was necessitated by the bird-flu outbreak in Kenya in 2006. As a result, the government earmarked communication as one of the intervention strategies to manage the public anxiety during the time and eliminate any crisis in the event that the perceived outbreak escalated. For this reason, the mass media combined with other communication channels were used to create public awareness and inform and educate the public by managing attitudes and behaviour of the public to combat the risk of contracting and transmitting bird-flu. The study focused on the communication initiatives used by the government of Kenya and consequently established that despite the widespread message reception by the audiences, the impact was still optimum fueling and eliciting negative reactions across the four groups of audiences under study. The study concludes that the overall communication campaign was not effective. This trend was attributed to the failure of the campaigners to take into account the socio-economic aspects of the audience, Besides, there was massive underutilization of interpersonal

communication which accounts for the lack of efficacy in this health communication campaign resulting to low levels of risk perception on bird flu by the audience. Just like Odengo (2018), the study under review is on health communication but under the realm of science communication just like the proposed study. The mass media are used to disseminate information, including scientific information, on bird flu to a Kenyan audience, which is both expert and non-expert. However, the study does not utilize narration or narration techniques to communicate scientific information on bird flu to the non-expert audience, a gap that the current study seeks to bridge. Otieno (2008) is purely a qualitative study, and therefore the study does not mention how the limitations of a purely qualitative study were surmounted. To address this, the current study adopted a mixed approach to address the weaknesses of a study that is either purely qualitative or purely quantitative.

Mungai (2018) examines contemporary African cinema narratives in an effort to initiate a socio-ideological reading of narratives. Specifically, the study draws correlations between the film's diegesis and the non-diegetic framework to which the film is based. The study focused on three key areas; social and ideological narratives, class struggles, and pluralism of narrative voices. The films under review were selected from East and West Africa. From West Africa, the study analyzed Kwaw Ansah's *Love Brewed in the African Pot* (1981), Abderrahmane Sissako's *Bamako* (2006), and Veronica Quarshie's *A Stab in the Dark* (1999). From East African region, the study focused on Wanuri Kihiu's *From a Whisper* (2008), Judy Kibinge's *Killer Necklace* (2009), Bob Nyanja's *Malooned* (2007) and Gavin Hood's *Eye in the Sky* (2015). The main thesis in this study is that films embolden people to review their social and ideological positions by appealing to the consciousness of their lives. Mungai (2018) is a study of films the reason why the research concerns itself with the

signifying process of film elements. The study under review was based on Semiotics theory that focuses on the analysis of textual elements as signifiers, often with hermeneutic references outside the film. The study is qualitative in nature, employing semi-comparative design to integrate recurrent ideas into integrated motifs about film and its connection to social change. The study is significant in that it provides a template that can be applied in studies of cinema and the many social situations of national importance such as negative ethnicity, governance, family, religion, modernity and tradition, and terrorism. Mungai (2018) studies cinema narratives with the purpose of proposing a model or framework for the social and ideological reading of the narrative within the mass media perspective. The current study also studies narratives but in terms of the techniques of narration in respect to news stories and not cinema as a genre of mass communication. Besides, the current study sought to study how the narrative techniques communicate science and technology in news stories to non-expert audiences. Unlike Mungai (2018), the current study used both quantitative and qualitative approaches to study narratives thus compensating for the weaknesses of a study that is purely qualitative or purely quantitative. Mungai's is a study within film studies, while the proposed study is within science communication.

Mogoi (2015) studies the impact of electronic media in promoting awareness about cervical cancer among women (18-65years) seeking reproductive health services at clinics 18 and 66 at the Kenyatta National Hospital in Nairobi County, Kenya. The objectives of the were: to determine the knowledge status about cervical cancer among the women; to investigate the influence of electronic media sources in providing information about cervical cancer among the women; to determine the influence of the nature of information as presented by electronic media; and to establish the factors that hinder access to information and participation in screening

programs. The made use of mixed method research design to collect both qualitative and quantitative data. The study adopted systematic random sampling to collect data from a sample size of 295. Mogoi established that the average number of women who seek reproductive health services at the study site per year was 8,400. To obtain qualitative data, the researcher sampled five health care givers and four gynecologists/oncologists at the reproductive health department of the hospital. The study used a questionnaire to collect quantitative data from the respondents, and interview guide for capturing qualitative data. Quantitative data was analyzed through descriptive and inferential statistics so as to enable the description of the distribution of scores in line with the study objectives. One-Way ANOVA was adopted to establish the correlation between knowledge levels and the socio-demographic characteristics of the respondents. Qualitative data was analyzed based on common and recurrent themes and data relayed in narrative form. The study findings indicated that knowledge levels on causes, symptoms, severity, treatment and prevention of cervical cancer were dismally low among the women. This was supported by the fact that a paltry of 65.0% of the respondents who revealed that they had neither heard of or gone for a *pap smear* test. The study established that radio, television alone was not adequate in creating awareness about cervical cancer since less than 20.0% of respondents reported to have received their information on cervical cancer from radio, and televisions, while over 68.2% reported to have got the information about cervical cancer from other sources. This trend was reported despite the fact that more than 90.0% of the sampled respondents reported to own a radio and/or a television. Majority of the respondents are said to have not taken any step towards cervical cancer prevention since no television nor radio messages were within their awareness

levels. Besides, inappropriate information, myths and misconceptions prevented women's preventive measures.

One-way *ANOVA* was employed to determine whether there was any significant relationship between the demographic characteristics and the validity of information that the respondents received. The results reveal that there was no significant relationship between valid or relevant information and socio-demographic characteristics of the respondents. The study concludes that cervical cancer is the leading killer among women in Kenya and globally. In addition, several factors such as lack of proper information, myths and misconceptions further obliterated women's progress towards cervical cancer prevention. Radio and television were found crucial media in dissemination of cervical cancer information but these media has achieved little in creating awareness about cervical cancer prevention since most of the information that the respondents received came from other sources and beside radio and television. The study thus recommends that a multi-sectoral approach be put in place towards cervical cancer prevention methods. The electronic media, especially the vernacular radio stations, stakeholders, health professionals and the government can form a concerted effort in cervical cancer awareness campaigns so as to prevent the cancer. Mogoi (2015) recommends further research to bridge the knowledge gaps and address the inappropriate information that derail women from cervical cancer prevention programs and initiatives.

Mogoi's study is on health communication focusing on the influence of electronic media on creating cancer awareness among reproductive women. The information meant to create awareness among this cohort of women comes from the electronic media, notably television and radio. Part of this information is scientific, for example

causes of cervical cancer, the screening process, and mode of treatment. Part of the audience target for this information (reproductive women) is non-expert on causes, screening and treatment of the cancer. Besides, the information comes from journalists in forms of news and programming on radio and television. Interestingly, the study found out that radio and television as media have not done enough to create cervical cancer awareness among the sampled reproductive women, which questions the techniques used to relay this information (scientific in nature) to the reproductive women who may be non-expert on the subject, except the female oncologists seeking treatment and are part of the sample. The study however does not mention narration techniques in connection with the communication of information meant to raise cervical cancer awareness among the sampled group even when narration techniques may have been used in news stories on cancer awareness on radio and television. Narration, based on the literature already reviewed in this chapter has been found to engage the audience, increase their awareness levels on the subject communicated and create familiarity with the subject of communication. The current study therefore seeks to examine how journalistic narrative techniques in news stories communicate science and technology to non-expert audiences.

Chepkwony (2020) conducted a study on the intersection of popular fiction and history through narrativizing events. The focus of the study is narrative techniques and how they interweave historical concerns within the Kenyan context. The study explores historiographic dimension as narratives in selected popular texts. The gist of the study is that popular literature renders in narrative form the country's historical moments. To Chepkwony, New Historicism as propounded by Greenblatt and Montrose texts are historical documents contextualised and rooted in culture depicting historical processes and epochs of a society. Using purposive sampling, the texts

Wahome Mutahi's *Three Days on the Cross*, Kinyanjui Kombani's *The Last Villains of Molo* and Muroki Ndung'u's *A Friend of the Court* were selected since the texts were rich in with fictionalized history. Qualitative research method that was library-based was employed to obtain data relevant to analysis and interpretation. An interpretivist research design was used. The study establishes that literature has affinity to history since there is interconnectedness. The study reinforces the dialectical polemics on both fictionalization of history and historicization of fiction; a debate that still bombards the literary scene. Chepkwony's study is on literature and not journalism and therefore discusses narrative techniques in the context of popular fiction and its relationship with history. The study under review is purely qualitative unlike the current study that uses both qualitative and quantitative approaches with the latter being dominant. The current study adopts a pragmatic paradigm as opposed to the interpretivist paradigm in Chepkwony's study. In sum therefore, Chepkwony does not study narrative techniques in newspaper news stories nor the communication of scientific and technological information to non-expert audiences. The current study thus was designed with these gaps in mind.

## **2.9 Rationale for the Study based on Literature Review**

Based on the literature review, the rationale for the study can be argued on a number of grounds. Foremost, the reviewed studies on narrative as communication medium have been conducted in health fields such as Nursing, Midwifery, Epidemiology and Public health. Apart from health, some have been conducted in Education communication, environmental science and marketing especially on cognition and purchasing decisions. None of the studies reviewed has been conducted within the realm of communication studies and in particular science communication, and

specifically how communication professionals such as journalists communicate to non-expert audiences using narration. The theories that have been reviewed in the literature review are limited to the functionalist and structuralism approaches to the study of narratives, meaning that the two theories look at a narrative in terms of functions and structure. This gap has been filled by discussing the participatory model for communicating science and technology to non-expert audiences. The model takes into account the fact that non-expert audiences are an inclusive component in any communication transaction involving science and technology. In situations where narratives are utilized to communicate science with non-expert audiences, the studies have adopted a qualitative approach, and not both qualitative and quantitative as the current study proposes. In quantitative approach studies, the samples have been small since those studies have adopted an experimental design where small sample sizes are recommended. The current study adopted a descriptive survey and a census since the study was conducted in a natural set up and not in controlled environment of the experimental design.

## **2.10 Chapter Summary**

The chapter on literature review has discussed the meaning and nature of key concepts in the current study such as narrative as a mode of communication, communication science and its situation in communication studies. The purpose was to contextualize these terms within the communication studies discipline, the discipline within which the current study is undertaken. The chapter has reviewed the narrative theory within the functionalism, structuralism, discourse and semiotic approaches. The purpose was to situate the study within a theoretical framework from which to understand and approach the concept of narrative techniques before connecting them

to communication of scientific and technological information. Science communication has also been discussed alongside narratives as a medium of communicating scientific and technological information to non-expert audiences. The literature review also subsumes a review of current studies drawing a gap between the studies and the current study. A case for the current study has been put forward based on the literature review. The next chapter discusses the methodology used to conduct the current study.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Overview**

This chapter discusses the research methodology adopted for this study. The chapter presents the research approach for the study and a description of the research design. The chapter highlights the research paradigm, methodology, the study population, and sampling techniques. Besides, this chapter discusses data collection procedures and the research instruments used for data collection, and how the instruments were tested for validity and reliability. Lastly, data analysis methods and techniques are discussed as well as the research ethics that were upheld in this study.

#### **3.2 Research Methodology**

According to Wahyuni (2012) the term methodology may be described as both domain and road-map, through which research is conducted and within the matrix of a given framework. Teddlie and Tashakkori (2009) as quoted by Ntulo (2017) posit that research methodology is a systematic and scientific endeavour that procedurally demonstrate how research hypotheses are tested at a given significance level, and how such hypotheses will be rejected or accepted depending on the outcome of the relevant data analysis. It also encompasses the philosophies that determine the selection of a given research method from a pool that there is (Wahyuni, 2012). On the other hand, research methods refer to a set of specific strategies, procedures, tools and techniques to gather and analyze data. They are specific strategies and procedures for implementing research design including sampling, data collection, analysis and interpretation of the findings (Teddlie and Tashakkori, 2009).

A methodology, therefore, is a road map for research that shows a research paradigm and theoretical framework, while research methods are systematic techniques, procedures and tools employed in collecting and analyzing data (Teddlie and Tashakkori, 2009 cited in Ntulo 2017). In conclusion, therefore, research methods are quite different from research methodologies and research paradigms since a researcher can employ one method in different research methodologies.

### **3.2.1 Research Paradigm**

Different researchers have conceptualized the term paradigm in various ways. Key among those researchers is Neuman (2014). Neuman describes research paradigm as an overall detailed framework for applicable theory and research which subsumes research assumptions, fundamental principles, models of and methods for enquiry. Research Paradigm therefore is set of philosophies that guide the worldview of researchers.

On another level, Guba (1990) describes a research paradigm as a world-view adopted by a community of researchers on the basis of a common set of philosophies. Research paradigm is a broad perspective on conducting research (Ntulo 2017). Research paradigm is used to describe the detailed process through which researchers make decisions on the subject of research, how the subject can be approached, the procedures involved and how the resulting findings can be discussed based on available literature. A research paradigm is therefore a shared set of philosophies, perspectives, or world view that informs the conduct of research within a discipline or set of disciplines (Guba and Linkoln, 1994; Teddlie and Tashakkori, 2009). Consequently, Krauss (2005) sums up that a paradigm is a basic variant across researchers on the basis ontological, epistemological, axiological world-views.

Krauss (2005) argues that ontology is all about the nature and existence of reality. Moreover, ontology is concerned with the basis of reality and what constitutes the concept of reality in a given context. Axiology, on the other hand, focuses on the researcher's value systems and how they are upheld in the research process (Ntulo 2017). The term epistemology is coined from the Greek root *epistêmê*, which in Greek means knowledge. Put simply, epistemology is the researcher's worldview of knowledge based on the empirical stand point (Troachin, 2000). Epistemology addresses itself to the correlation what is known and who knows it; the systematic process towards our existing knowledge; and what passes along as knowledge (Creswell 2014). Besides, epistemology orients itself with attendant correlation between the respondent, the researcher and the subject of research in a given discipline (Guba and Lincoln, 1994). In a nutshell, epistemology is the reasoning behind the generation of knowledge, synthesis and application of knowledge that is empirical and verifiable (Wahyuni, 2012).

On the basis of diverse paradigms, researchers interrogate different subjects, study those subjects differently, analyze them and make informed inferences based on collected or available data sets (Ntulo, 2017). Over the years, scholars never seem to have a consensus on the adoption of paradigms, and what is best for one set of scholars is not necessarily best and applicable for all others. For this reason, the study turns its attention the positivism, constructivism and pragmatism.

### **3.2.2 Positivists, Constructivists and Pragmatic Paradigms**

Any systematic approach to research will vary significantly based on value systems that determine the critical decisions that researchers make (Ntulo 2017). On the basis of philosophy, researchers hold claims to knowledge (ontology); normally detail their

procedural claims to knowledge (epistemology), specify the attached knowledge values (axiology), and provide the systematic and painstaking process towards the claims of knowledge (methodology). On the context of knowledge, there are six types of paradigms: positivists/scientific, post-positivists, constructivist/interpretive, advocacy participatory, critical analysis, and pragmatism (Creswell, 2003).

For positivists there seems to be a terrestrial world of knowledge independent of human cognition, factual in nature, a product of empiricism, and verification fact (Creswell, 2002). For positivists there will always be a definite reality existing, independent of those subject to it, but subject to discovery by researchers. Postivists claim that knowledge subsumes testable research hypotheses that can lead to empirical generalizations (Guba and Lincoln, 1994; Creswell, 2003; Teddlie and Tashakkori, 2009).

In the positivist tradition, what is or to be studied is independent of whoever studies it; and that knowledge can be unveiled and tested scientifically through such techniques as observation, measurement, estimation, and prediction of concepts in a given field of study (Creswell, 2014). Positivists are concerned with dualism and objectivism so much that they posit that the researcher and the research topic are not dependent on each other, and through painstaking universal procedures, the researcher and the subject of research can be objectively and systematically addressed.

Moreover, it is possible according to positivists to study the research participants without influencing them and without the participants influencing the researcher (Guba and Lincoln, 1994; Creswell, 2003; Teddlie and Tashakkori, 2009). This way, the research findings will be deemed valid and can be used to support theory and existing knowledge. Positivists are preoccupied with a quantitative approach in

research in which they make use of close-ended questionnaires, structured interviews and observation schedules as data collection instruments. Occasionally, positivists employ large sample sizes and use sample findings on the population characteristics (Symonds and Gorard, 2011). Creswell (2002) contends that positivism is oriented towards matriculate statistical analysis notably hypothesis testing, random sampling, aggregation, precision and measurement.

The constructivist approach is a derivative of constructivism. It holds that there is no universal reality out there; the world is a collection of the multiplicity of realities. Reality, will always be subjective according to the constructivist approach, and that, reality is determined by context notably a researcher's varied backgrounds, assumptions, experience and perceptions, the social environment, economic condition, political and the interaction between the individual and the researcher (Teddlie and Tashakkori, 2009; Symonds and Gorard, 2011; Tracy, 2013). Based on these diverse perspectives and experiences, reality can be a variation resulting to multiple meanings and perspectives (Neuman, 2011). To understand reality therefore, interpretivist researchers opt to interact and share in the experiences of research participants (Guba and Lincoln, 1994). This way, the approach takes a qualitative dimension. Constructivists or interpretivists as they are sometimes called contend that the researcher's values and attendant experiences cannot be separated from the research process. Values are seen as building blocks on which inquiry outcomes are built (Tracy, 2013).

Since human beings construct meaning as they experience the world they are studying, constructivists employ qualitative approaches in their studies, use open-ended questions so as to enable participants express their views. They also use

interviews, observation and focus group discussion to collect data for research (Creswell, 2003). They endeavour to investigate the context or setting of the participants making use of small sample sizes with based on a single case study.

Teddlie and Tashakkori (2009) contend that the proliferation of the of the single method research during the 1960s led to the emergence of paradigm wars which in turn culminated in mixed method research in which researchers employed both qualitative and quantitative research methods at the onset of 1990s. Consequently, the result was the pragmatic paradigm.

The pragmatic paradigm steered off from the ‘paradigm war’ pitying the positivist and interpretivist research philosophies (Tashakkori and Teddlie, 2009). Hence, a mixture of research philosophies was considered acceptable to approach to the understanding of social phenomena (Tashakkori and Teddlie, 2009; Johnson and Onwuegbuzie, 2004). The pragmatic approach proponents argue that the viability of a research methodology is based purely on its empirical and practical appropriacy (Johnson and Onwuegbuzie, 2004). Consequently, researchers are at liberty to settle for a paradigm that adequately answer the research questions and test the hypotheses under investigation.

For pragmatists, the most important thing is what is relevant and provides a solution to the research problem identified in a study (Ntulo 2017). Ntulo emphasizes that the research design need be laid out and structured on the basis of what answers the research questions, or tests the hypotheses of a research study. For to pragmatists, there is need to use of mixed approaches to understand the research problem (Creswell, 2009; Teddlie and Tashakkori, 2009; Johnson and Onwuegbuzie, 2004). Pragmatic paradigm combines the quantitative approaches based on positivists

paradigm and the qualitative approaches based on interpretivism or constructivism paradigm (Johnson and Onwuegbuzie, 2004; Denscombe, 2008; Feilzer, 2010).

Cresswell (2014) in summary posits the following based on his findings about the pragmatic paradigm:

- i. Pragmatism cannot be confined to any one philosophical system and reality. Individual researchers are at liberty to choose what works for them. The researcher has a leeway to decide which the methods, techniques, and procedures that best meet the needs and purpose of the study.
- ii. Researchers cannot restrict themselves to quantitative (positivists paradigm) or qualitative (Constructivist) paradigm. Researchers can make use of both quantitative and qualitative methods to address the needs of their studies.
- iii. Pragmatists perceive the world as a multiple of realities. For this reason, researchers look for many techniques of collecting and analyzing data rather than sticking to one research approach that may be either qualitative or quantitative
- iv. Truth is contextual. Therefore, researchers can employ both quantitative and qualitative methods because the combination provide the best understanding of what constitutes truth in research problem. This way, researchers must justify the combination of quantitative and qualitative methods (Creswell, 2003).
- v. Pragmatists agree that research resides in contexts which may be social, historical, and political. To unravel these contexts, researchers need to combine both quantitative and qualitative research methods.

- vi. Finally, pragmatic research paradigm employs mixed methods, multiplicity of worldviews, and holds various assumptions about data, data collection and analysis.

From the foregoing, the current study adopts a pragmatic paradigm in studying narrative techniques by newspaper news journalists in communicating scientific and technological information to non-expert audiences. Pragmatic paradigm was adopted because it steers away the controversial issues of truth and reality and appreciates that the multiple realities that exist in research which are a subject empirical inquiry, and which require the solution practical problems of a real world (Creswell and Plano Clark, 2007). This paradigm allows the researcher to steer of the constraints imposed by the dichotomy between positivism and constructivism. Besides, the paradigm appreciates that researchers are at liberty to select research method or technique that is appropriate to a given research situation. In a nut shell, pragmatic researchers are cognizant of all available research techniques and methods depending on the underlying research questions or hypotheses, rather than with regard to some held biases about paradigm dominance in social science researches (Onwuegbuzie and Leech, 2004).

The pragmatic paradigm appreciates the centrality of and takes into consideration the research problem and ultimately employs applicable approaches to studying the problem (Creswell, 2003). With the research objectives or hypotheses as the fulcrum, data collection and analysis methods and techniques, which adequately address the research problem come into play.

It should be noted that the pragmatic paradigm has been criticized by some scholars. Some scholars have expressed their reservations with the adoption of the pragmatic

research paradigm, because it has some weaknesses just like other research paradigms. Consequently, this study finds it appropriate in studying narrative techniques by newspaper news journalists in communicating scientific and technological information to non-expert audiences. The Pragmatic approach makes it possible for the researcher to employ both quantitative and qualitative methods that are relevant to framing, addressing, and testing research objectives and hypotheses (Creswell & Plano Clark, 2007; Onwuegbuzie and Leech, 2004). Pragmatism goes for what works best in addressing the needs of a particular research study needs.

Feilzer (2010) contends that pragmatism does not subscribe to a particular method and does not similarly exclude others. It seeks to investigate research questions or hypotheses, theory, or phenomenon on the basis of relevant research method (Onwuegbuzie and Leech, 2004). The application of both quantitative and qualitative methods enables the current researcher, to apply multiple viewpoints, perspectives, positions, and standpoints with regard to the current study. The use of quantitative and qualitative approach helped develop the researcher to develop a framework to validate quantitative findings obtained from the questionnaire using the findings from the qualitative data comprising of samples of filed news stories by journalists.

The basis of quantitative research is the researcher's concerns and needs of the study while qualitative research is often driven by the need to appropriately detail the participant's voice (Onwuegbuzie and Leech, 2004). The current study combined these persuasions into a single investigation. Creswell (2009) contends that the inclusion of quantitative data can help compensate for the fact that qualitative data typically cannot generalize the research findings on the population. On another level, the inclusion of qualitative data is beneficial in discussing the relationships analyzed

through quantitative data. In the context of this study, quantitative techniques were used in selecting the population, enable data collection using questionnaires and enhance data analysis using statistical measurements. Statistical tests were carried out to test the relationships between different variables in the research hypotheses in the current study.

### **3.3 Research Design**

Scholars have discussed three types of research designs namely quantitative, qualitative and mixed research design. However, the most common research designs that scholars seem to agree on are quantitative and qualitative (Cresswell, 2014; Teddlie and Tashakkori, 2009). According to Denzin and Lincoln (2005), a research design provides conventions that subsume theories and methods for collecting data. It is a plan for research that combines the philosophical assumptions, strategies of inquiry, and specific methods (Creswell, 2003). The design provides a structure that guides the execution of a research method and the analysis of the research data with a view of arriving at conclusions about the research problem (Bryman, 2004).

Previous studies have employed either quantitative or qualitative approaches to study research phenomena which were previously unexplained or misunderstood (Welman, Kruger and Mitchel 2005; Creswell 2003). Creswell (2003) argues that to use only a quantitative or a qualitative approach will fall short of major approaches being used in the social and human sciences. In the current study, the use of both quantitative and qualitative research methods were adopted, with the quantitative approach being the dominant approach. Creswell and Plano (2007) argue that one may use both quantitative and qualitative approaches equally, or one research approach may be dominant over the other, depending on the nature of the study and the instruments

used to collect data support this. Besides, Feilzer (2010) emphasizes the need for both qualitative and quantitative approaches for purposes of extensive and intensive understanding a particular research area. Since there is no single method without weaknesses, the two methods were adopted. This addresses the weaknesses of one method and maximizing the benefits of the other in an attempt to arrive valid and reliable research findings.

Guided by the pragmatists world view, the current study opted for what works best to address the study purpose or hypotheses. The ultimate aim was to come up with the findings that are valid and reliable enough to sustain the study on journalistic narrative techniques in newspaper news stories to communicate scientific and technological information to non-expert audiences.

### **3.3.1 The Quantitative Research Approach**

Welman, Kruger and Mitchel (2005) posit that quantitative approach employs the scientific method in human behavioral research and stresses that research can only be confined to what can be observed and measured objectively. Given that this research employed the use of hypotheses together with pragmatic paradigm, the quantitative approach was appropriate and consequently became the dominant research approach. Quantitative approach is selected to be the dominant research approach because it focuses on quantification of data and stresses the measurement and analysis of relationships among variables based on the measurement scales of variables (Creswell, 2009).

This study employed a quantitative approach in the census as well as in data analysis and presentation. The quantitative approach was crucial in testing hypotheses as well

as analysis of relationships between variables in the hypotheses with the aim of summarizing the journalistic narrative techniques utilized by newspaper news journalists in communicating science and technology information to non-expert audiences. However, scholars have criticized quantitative approach. When a researcher attempts to obtain a deeper understanding of a research problem, the use of a quantitative as a research instrument may not be ideal to the situation. In addition, quantitative research has been criticized for challenges associated with randomly subjecting the participants to experimental situations. For this reason, the approach is not considered an ideal in investigating human behavior. For this reason, these shortcomings were circumvented through the adoption of particular aspects of qualitative research, notably content analysis of news stories filed by journalists in North Rift region on science and technology.

### **3.3.2 The Qualitative Research Approach**

Qualitative research confines itself to naturally occurring events in natural set ups that comprise of real life situations and as such, data is collected in close proximity to a specific situation (Ntulo 2017). Qualitative researchers therefore are more preoccupied with issues of nobility, texture and the stature of raw data because their inductive approach emphasizes developing insights and generalizations from the data gathered (Neuman, 2011). A Qualitative method entails use of data collection methods such as observation, interviews and review of documents (Ntulo 2017). Cresswell (2014) argues that qualitative research approach is used when data collected is used to detail persons, organizations, settings or phenomena. It is a rendition of the what, how, when, and where of phenomena in terms of their essence

and stature. Creswell concludes that qualitative research unveils meanings of concepts, characteristics, and essence of phenomena.

Qualitative research design was adopted so as to analyze qualitative content in form of stories filed by journalists in the north rift region in 2019, and which communicate science and technology information to the non-expert audience. On the converse, qualitative research approach has been criticized by research scholars on the basis of lack of objectivity and scientific rigour. Besides and if not well executed, it can hinder the generalizability of the findings and compromise validity and reliability of the study. On the basis of these weaknesses, research hypotheses and the pragmatic research paradigm were adopted for the study.

### **3.3.3 Justification for the Mixed Approach**

This study employed the use of mixed method approach. In this design, the researcher adopted *QUANT* a dominant approach, while the *QUAL* playing a subsidiary role (Creswell, 2014; Creswell and Plano Clark, 2007). The quantitative approach employed use of questionnaires to collect large amounts of quantitative data from journalists in the North Rift region, while qualitative data comprised of the samples of news stories containing science and technology information communicated to non-expert audience. The use of quantitative and qualitative approach in this study was preferable to enable the researcher to conduct a more comprehensive study of the narrative techniques used by journalists to communicate science and technology information to non-expert audiences.

The use of *QUANT* and *QUAL* research approaches were employed so that the results are not methodological renditions, and that, the weaknesses of one method

were made up for by the other (Mills, Durepos and Wiebe 2010). In addition, the quantitative approach is the best fit for explanatory research, while qualitative approach is more suited to descriptive studies (Mwanje, 2001; Kothari, 2004). The quantitative approach was used to collect data for purposes of operationalizing variables and analyzing the relationships among them; to enable generalization of sample findings on the population; make predictions about variables as well as summarize the relationships among narrative techniques in their communication of science and technology information. The qualitative research approach was therefore deemed relevant to in determining extent to which use of narration techniques in samples of selected media content (selected news stories) can communicate science and technology to non-expert audiences.

### **3.4 Research Method**

The current study made use of a survey research method. Survey research method is commonly preferred data gathering technique in social science research (Sarantakos, 1998; Mills, Durepos and Wiebe, 2010). Surveys are employed in studies that target individual people as a unit of analysis (Babbie, 2004). The current study included newspaper news journalists in the North Rift region from the Kenya's leading newspapers, notably *Nation*, the *Standard*, *The Star* and *The People Daily*.

Creswell (2014) conceives a survey as a set systematic procedures that determine what information is to be collected, from whom and how. A survey renders a quantitative or numeric rendition of trends, attitudes, or opinions of a population by studying a sample of the population. The survey research aims at collecting and analyzing data by focusing on the research population or a sample which is representative of the research population. Besides, the survey gives a cross-sectional

of the research population's occurrence, distribution, and interrelationships among naturally occurring variables (Pickard 2007; Powell, Connaway and Silipigni, 2004). Surveys, by their very nature, are either cross-sectional, longitudinal and trend or prediction studies (Cohen, Manion and Morrison, 2007; Leedy and Omrod, 2005). On another level, longitudinal, cross-sectional and trend studies are part of developmental research because they focus on the current status of a population in respect to one or more variables. Longitudinal studies laborious as they command huge resources and time because the variables have to be studied for a number of times so as to ascertain their long term relationships (Robson, 2002).

Trend studies typically focus on how concepts vary across; cohort studies focus on historical and periodic changes over time; while panel studies trace and explain how people change over time (Cohen, Manion and Morrison, 2007). Since this study adopted a pragmatic approach and set the research hypotheses, the survey method was deemed handy. This study therefore made use of a descriptive cross-sectional approach so as to survey a universe of issues. Cross sectional descriptive survey enabled the researcher in inferring and explaining data; as well as generating verifiable data using the research instruments and questions across all the sampled participants. The method relies on huge data gathering from dispersed population in order to enable generalizations to be made about given variables (Cohen, Manion and Morrison 2007). Besides, the cross-sectional survey gathers data on a one-off basis targeting both quantitative and qualitative data (Ntulo, 2017). In comparison to the other research approaches, the survey method is appropriate for capturing personal characteristics based on the current situation and status of the population. Thus, the cross-sectional survey deemed relevant and apt at collecting qualitative data related to

the extent of use of journalistic narrative techniques in samples of media content filed by journalists that communicate science and technology to non-expert audiences.

The cross-sectional survey was suitable in the use questionnaires as to collect data from the respondents (Singh 2012). Since the study had a number of variables to test, the cross-sectional survey research method was deemed appropriate. Independent variables included use of viewpoint techniques, use of scene construction techniques and event (re)scheduling techniques. Dependent variable on the other hand is communication of scientific and technological information to non-expert audiences.

### **3.5 Population and Study Setting**

The term population is used to describe an entire entity of individuals, events or objects comprising of observable characteristics (Neuman, 2014). The population then becomes a set of objects whether animate or inanimate targeted in a study from which a research sample is obtainable. To identify a population, a decision on the unit being sampled, the location of population (Neuman, 2014). The term unit of analysis is used to include people and inanimate entities at large (Bryman, 2004).

In the context of the current study, the following counties in the north rift region were included in the study together with the newspaper news journalists based in these counties: Nandi, Uasin Gishu, Trans Nzoia, Elgeyo Marakwet, Baringo, West Pokot and Turkana. The North Rift region is selected as the locale for the study since the region is a fertile ground for news stories on science and technology, notably being the home for technologies based on agriculture, the recent discovery of oil in Turkana, home to the second largest referral hospital that recently separated the conjoined twins, home to the tourist attraction sites such as lakes, gorges, geysers; home to a

number of learning institutions where scientific and technological innovation are initiated. All these features justify the choice of the study location, and the news stories selected for the study touch on these subjects. The sampling frame for the study is summarized in Table 3.5.

**Table 3.5: Sampling Frame**

<b>Newspaper/ Town</b>	<b>Eldoret</b>	<b>Nandi</b>	<b>Trans Nzoia</b>	<b>West Pokot</b>	<b>Turkana</b>	<b>Elgeyo- Marakwet</b>	<b>Baringo</b>	<b>TOTAL</b>
Daily Nation	5	2	2	2	2	2	2	17
The Standard	5	2	2	2	2	2	2	17
The Star	3	2	2	2	2	2	2	15
People Daily	3	2	2	2	2	2	2	15
<b>TOTAL</b>	<b>16</b>	<b>08</b>	<b>08</b>	<b>08</b>	<b>08</b>	<b>08</b>	<b>08</b>	<b>64</b>

Thus, the total number of journalists for the four leading Kenyan newspapers is **64**. This number includes the reporters, and photographers whose photographs accompany the news stories that the reporters file. The number also includes bureau chiefs for the four newspapers. The bureau chiefs also develop and file stories for the newspapers. All these were permanent and pensionable.

### **3.6 Sample Size**

The term sample size is used to refer to a number of entities selected from the target population (Kothari, 2004). Neuman (2006) observes that a researcher's decision to arrive at a sample size is dependent on the degree of accuracy required; the degree of variability of the population; and the number of variables to be analyzed. This study

examines the narrative techniques by newspaper news journalists to communicate science and technology to non-expert audiences. The sample size (64 cases) was settled on through a census based on the fact that the sample is highly representative of the population that was earmarked for this study. Since the target population was too small to be sampled, the study opted to study the entire population. The sample of 64 journalists were limited to newspapers only, and national newspapers: *The Nation*, *The Standard*, *The People Daily* and *The Star*. Regional newspapers were not included due to their limited circulation and limited content to regional issues.

### **3.7 Data Collection Methods**

Data collection focuses on obtaining data using data collection tools and methods to test or answer research questions or hypotheses (Tracy, 2013). The type of data collection method is based on the designed research questions or research hypotheses. Based on the research paradigm and the research method adopted for this study, collecting both quantitative and qualitative data was made possible. Quantitative data was obtained from the sampled respondents through the use of both structured and semi-structured questionnaires. On the other hand, the qualitative data comprised of samples of media genres containing science and technology information filed by journalists in 2019.

#### **3.7.1 Questionnaires**

Questionnaires are considered the most common data collection tools in social science research (Pickard, 2007). Questionnaires are preferred for collecting survey data in numerical form, and are, by and large, administered without the physical presence of the researcher (Neuman, 2014). The cardinal principles to consider in structuring

questions are the content, structure, format and sequence (Nachmias and Nachmias, 1996).

Neuman (2014) argues that a good questionnaire must contain the questions required and collect relevant data so as to test the research hypotheses. The questions must be clear clarity, succinct and capable of generating high response from respondents. Various scholars have discussed the advantages and disadvantages of questionnaires (Babbie and Mouton, 2001; Cohen, Manion and Morrison, 2007; Nachmias and Nachmias, 1996; Leedy and Ormrod, 2005; Mugenda and Mugenda, 2003; Creswell, 2014). Compared to other data collection tools, the questionnaire is easier to administer to a high number of respondents surveyed within a short duration irrespective of how dispersed the sample is in a population

This study used a questionnaire consisting of closed-ended questions to gather information from 64 newspaper news journalists in the seven counties in the north rift region. The questionnaire was adopted since it enables the researcher to collect data from the respondents in a cost-effective manner. The questionnaire comprised of Likert scale ranging from 1 to 5. The items were measured in ordinal scale. Respondents were given ample time to complete the questionnaires themselves. This decision was guided by Robson (2002) who opines that questionnaires are very convenient to the respondents since the respondents can complete them at their comfort.

To ensure that all the variables in the hypotheses are sufficiently covered, the questionnaires was designed with clarity in mind, and based on simple language so as to maximize the responses from the respondents. Besides, the questionnaire was designed in a manner to start with the simplest questions. Where necessary,

clarifications were made to the respondents to enable them understand the questions. In addition, before the use of the questionnaire, a brief orientation was handy. The researcher made effort to explain the topic of and the purpose of the questionnaires.

Since the study was conducted on an expansive setting, and based on the fact that data was collected simultaneously from many respondents, it was not possible for the researcher to undertake the collection of data through questionnaires alone. Two research assistants were employed in the administration of the questionnaire. The researcher recruited research assistants who were degree holders in Communication and Journalism and had a wide experience in media research.

In order to realize validity, reliability, consistency, efficiency and continuity of the study, these research assistants were initially trained on data collection on the subject of the study. Training comprised of two-hour sessions for three days. The training sessions acquainted the research assistants with key terminologies on the questionnaire. Besides, the training sessions involved going through each item on the questionnaire. Care was taken to sort out any biases or inconsistencies on the questionnaire

The items on the questionnaire were ranked on a five-point scale (Likert scale) which asked the respondents to rate their degree of agreement and disagreement to a particular question. Nominal, ordinal, ratio and interval scales were used because since the items required quantitative data measured in all these scales. This made it possible to code and analyze using statistical packages (Robson 2002) notably, SPSS version 23 which was used to code and analyze data in this study.

### 3.7.2 Document Analysis

According to Babbie (2010) document analysis is a technique of data collection which involves analysis of content from written sources in order to make certain deductions based on the study's research variables. According to Babbie, the method is used in qualitative research as a method of qualitative analysis.

Bowen (2009) sees document analysis is essential aspect of triangulation; the thoughtful mixture of methodologies in an attempt to study a universe. To arrive at any form of convergence and justification of findings, researchers normally rely on multiple instruments and methods to collect data from various sources. The aim of triangulating is to generate adequate evidence that eventually builds towards credibility of information required for the study (Bowen, 2009). Supporting the study findings from the analysis of data sets is useful in minimizing attendant biases since credible information is obtained from various and diverse sources. Besides, a mixture of qualitative and quantitative data beds well with the mixed approach and the pragmatic paradigm adopted in this study.

In analysis of document, the researcher must specify the document type (report, records, news stories etc), the nature of the document (government, corporate or institution document), its dates, where written, author and title, the aim of the document, the factual information contained, why the document is a valuable source of information, how the document can be used, what the document does not answer and could be answered by the author should all be brought out (Marshall, and Rossman, 1995). This is done in order to validate the documents and ensure validity of the information for purposes of research.

In document analysis, a researcher can use a variety of texts for research, although by far the most common is the use of written documents (O’Leary, 2014). The current study used written documents in form of news stories published in 2019 as carried by Kenya’s four leading newspapers. The researcher selected four newspaper articles based on the research, variables (viewpoint techniques, scene construction techniques and event scheduling techniques), currency that is, latest publications by the time the study was being conducted (in 2019); and subject matter, that is, science and technology content. Quality of the documents (newspaper news stories) was ensured by selecting stories that had gone through editorial process to ensure accuracy, reliability, readability, communicative ability, correctness and clarity.

The researcher reviewed the documents based on their original purpose and the target audience, in this case, the non-expert audiences the target audience. In each of the newspaper stories, author was a firsthand witness of the events although in some cases, the author’s account is supplemented by the voices of the witnesses and experts. The documents were all obtained from credible sources, that is, the media companies’ databases. In line with Bowen’s (2009) assertion, the documents (newspaper news stories) were ascertained in terms of comprehensiveness and completeness of data.

In addition, the researcher determined what is being searched for, then documented it and organized the frequency and amount of occurrences within each story. The information was then organized into what is related to the research hypotheses

The researcher then undertook the thematic analysis, which a form of pattern recognition with the document’s data (Bowen, 2009). This analysis took into account emerging themes based on the codes derived from the narrative theory based on the

functionalist and structuralist approaches to the study of narratives. This entailed painstaking reading and re-reading of the texts, as well as coding and construction of data categories. The resulting codes and thematic categories were integrated to determine the resulting patterns and trends among qualitative data. This was done, as Bowen sums it up, in such a way to produce empirical universe of knowledge

### **3.7.3 Justification for Document Analysis**

Scholars decide to use document analysis based on a number of reasons. Firstly, document analysis is essential in gathering data that is more effective and efficient since the documents are manageable (Babbie, 2010). Documents are also easily available and accessible as the policy or relevant law permits and as such they come in different forms. This therefore makes documents a very accessible and reliable source of data.

Obtaining and analyzing documents is often far more cost efficient and time efficient than conducting your own research or experiments (Bowen, 2009). Also, documents are stable, non-reactive data sources, meaning that they can be read and reviewed multiple times and remain unchanged by the researcher's influence or research process (Bowen, 2009).

Document analysis is preferred since it can be used to support and embolden research (Babbie, 2010). Document analysis can be used across fields of research, whether as a primary source of data or as an addition to other methods. Documents supplement research data, thus enhancing the reliability and validity of such data. Documents entail background information and a broad basis for data build-up, thus essential in contextualizing a study in a given field (Bowen, 2009).

Documents provide data which observation as a method cannot generate thus giving insight into details that informants would have otherwise not obtain. Document analysis can be an indicator to areas that need further interrogation and research by directing a researcher to areas that need that need to observed. This way, document analysis ensures research study is not only critical, but quite comprehensive as well (Bowen, 2009).

### **3.8 Validity and Reliability of Research Instruments**

The strength of a research study is determined by how valid and reproducible the results of data collection and analysis are (Ntulo 2017). In a nut-shell, the instruments or tools employed in data collection must generate valid and reliable data that can answer the research questions and test the hypotheses based on the study (Mugenda and Mugenda, 2003). Reliability and validity are central to both quantitative and qualitative research undertakings (Babbie and Mouton, 2001).

The purpose of validity and reliability therefore is to enhance the truthfulness, credibility and believability of research findings so much that a research will be considered valid when the conclusions are accurate and reproducible each time of undertaking (Babbie, 2004; Bryman 2004). However, different scholars view validity and reliability in both quantitative and qualitative studies differently. Tracy (2013) sees validity in quantitative research as one built on objectivity, generalizability, replicability, predictability and controllability of a research undertaking. Tracy further sees validity in qualitative research as being based honesty, richness, authenticity, depth, scope and subjectivity of a research undertaking. Conversely, Tracy (2013) opines that reliability in quantitative is all about consistency (stability), accuracy, predictability, equivalence, replicability, concurrence, descriptive and causal potential

of the study, while in qualitative research, Tracy sees reliability as accuracy, fairness, dependability, comprehensiveness, empathy, uniqueness and conformability of the study. In the current study thus validity and reliability was ensured through appropriacy in terms of instrumentation, piloting of the research instruments and triangulation as guided by Creswell (2014).

### **3.8.1 Pre-testing of Research Instruments**

Creswell (2014) argues that research questions require clarity and consistency in terms of meaning in a bid to limit bias and maximize the response rates from the respondents. When the research instruments are poorly constructed, the responses from them can lead to a researcher making erroneous conclusions. Consequently, pre-testing of the research instruments is aimed at maximizing the response rates and to enable a researcher make verifiable conclusions.

Neuman (2011) suggests that research instruments need undergo testing and pretesting during their formulation to improve their validity and reliability. This is because, and as Neuman, argues reliability and validity are the foundation stones in any data collection and analysis as they determine the study's findings. In the current study, pre-testing of research instruments was undertaken prior to the actual study. Pre-testing was conducted using fifty journalists from South Rift region who report for Kenya's leading newspapers, *The Nation*, *The Standard*, *People Daily* and *The Star*. The journalists were given the questionnaire and requested to complete it within two weeks and to comment on the clarity and suitability of the instrument. The findings were coded and analyzed such that the results of the first and second administration of the questionnaire were compared using Cronbach Alpha to

determine the reliability coefficient. The co-efficient of 0.6 was obtained implying that the instrument passed the reliability test.

Errors due to constructs statement, variable operationalization were identified during pre-testing were rectified. Any terminologies that required clarification and revision were identified, and consequently, instruments were revised to for purposes of clarity. This enhanced content and construct validity.

### **3.8 .2 Triangulation**

Triangulation is defined as the use of several and different research methods, methodologies, techniques and perspectives for purposes of building on the validity of the research findings (Babbie, 2004). For Babbie triangulation is premised on the assertion attendant biases in data sources, investigations and methods can be countered. The gist of triangulation is that by obtaining data from diverse sources, methods and instruments potential threats to validity are minimized. This inevitably reduces the chances of drawing wrong conclusions. There are several ways of executing triangulation. Babbie (2004) identifies the following forms of triangulation: data triangulation, investigation triangulation, methodological triangulation and triangulation of theories.

A triangulated theoretical framework involving a combination of post-structuralism and functionalism from which the narrative theory was developed informed this study. Narration, as explained in the literature review, is understood within the narrative theory, which has its origin in the post-structuralism and constructionist traditions. Pragmatic research paradigm was combined with both quantitative and qualitative research approaches. In this study, quantitative method was deemed dominant

(QUAL) with some aspects of qualitative methods (QUAL) were considered as the minor approach. Triangulation thus combined the qualitative and quantitative data of this study, combined the qualitative and quantitative data analysis technique and converged multiple research design and approaches to execute this study. Both approaches converged at the level of data analysis such that relevant literature was used to discuss and support the findings from both approaches.

### **3.9 Data Analysis and Presentation**

Data analysis refers to the operations employed by a researcher to summarize the data collected from respondents and eventually organizing them into codes for purposes of answering research questions or hypotheses (Ntulo, 2017). Quantitative data analysis entails the use of relevant and appropriate data analysis statistical techniques, while Qualitative data analysis entails investigating the patterns among data, discussing these patterns and supporting them using published literature.

The current study employed both primary and secondary data. The primary data was obtained from the field. Primary data for this study was obtained from selected from 64 newspaper news journalists in the north rift region. This data was based on the variables in the research hypotheses questions. Secondary data will be obtained from published news stories that the 64 journalists have published in 2019. The criteria for selection of news stories was content on science and technology, publication in 2019, contained in the four leading newspapers and availability of the research variables notably scene construction techniques, event scheduling/structuring techniques and viewpoint techniques. A detailed search in the websites of each of the four newspaper companies was done for the year 2019 which narrowed down to the beat on science and technology and then later to the presence of the journalistic narrative techniques.

The result was four journalistic narratives that fitted the criteria. These journalistic narratives are attached to the appendix section of this study.

Since the current study was pragmatic in nature, the researcher adopted the relevant data analysis procedures for quantitative and qualitative based on the nature of variables and the relationships to be tested. In addition, quantitative and qualitative data analyses were carried out to test the research hypotheses. All relevant data from questionnaires and published content were collated based on research hypotheses.

Quantitative data was analyzed through the statistical techniques, notably, Chi Square test of independent samples, and T-test to test the relationship among variables in the research hypotheses. The Regression Model was used to summarize the journalistic narrative techniques used to communicate scientific and technological information to non-expert audiences. Statistical Package for Social Scientists (SPSS) version 23 software program was used to analyze quantitative data collected through questionnaires. SPSS was used because it enables coding of raw data, coding of variables, and comparison of data entries to carry out a wide range of statistical analyses. In addition, SPSS enhanced the analysis of data across various levels and generating tables for which to tabulate quantitative data (Pickard, 2007). Frequencies, percentages, statistical tests were used to analyze and present quantitative data from questionnaires. Qualitative data was thematically organized based on variables in the research questions and the content to be analyzed.

### **3.10 Ethical Considerations**

The term ethics can be defined as what is or not legitimate, in a research undertaking (Neuman, 2006). Ethical issues are at the centre of any social and behavioral research

where human subjects are involved. Many ethical issues entail a balancing act between two cardinals: the pursuit of scientific knowledge, and the rights of those being studied (Neuman, 2006).

This study took into account the Moi University research ethics policy of seeking a research permission from the university before undertaking data collection processes. The researcher also complied with the National Commission for Science Technology and Innovation (NACOSTI) guidelines and authority so as to conduct research in journalistic narrative techniques used to communicate science and technology information to non-expert audiences.

This study took into consideration the complied with the National Council for Science and Technology Innovation (NACOSTI) guidelines and authority to conduct research. In this regard, the participants were asked in order to evaluate the procedures to be followed while getting involved in the study, and make an informed judgment so as to whether or not, they wanted to participate in the study.

Additionally, cultural issues were taken into consideration to avoid misconceptions, which might affect the data collection from respondents and eventually compromise the validity and reliability of the study. Neuman (2011) argues that respondents are likely to supply inaccurate information without mutual respect and trust.

Further, the study attributed all sources of information obtained and accessed during the study so as to avoid plagiarism. Besides, respondents' privacy, anonymity and confidentiality were observed and upheld during the entire tenure of the study.

To ensure transparency and data management during this research, the researcher systematically documented, organized, and shared data throughout the research

lifecycle to ensure integrity, reproducibility, and ethical compliance. Key practices included creating a data management plan, adhering to ethical standards for data collection and privacy, and sharing data and methods openly where possible, following the principles that data needs to be as open as possible. This fostered trust, allowed for the verification of results.

The study ensured the ethical and legal compliance. The study adhered to ethical guidelines and legal requirements, such as the Data Protection Act 2019 regarding the protection of personal and corporate information and maintained proper documentation of participant consent and privacy protections.

### **3.11 Chapter Summary**

The chapter has described the methods, techniques and procedures that the researcher used in conducting the current study. These include the research design, research approach and method, sampling and the procedures and techniques to be adopted, data analysis methods and techniques. Also discussed are measures to ensure the trustworthiness of the study and ethical considerations before undertaking the study. The next chapter discusses data presentation, analysis, and a detailed discussion on findings.

## CHAPTER FOUR

### DATA PRESENTATION, ANALYSIS AND DISCUSSION OF FINDINGS

#### 4.1 Overview

The chapter reports results that emerged from the survey designed to explore narrative techniques that newspaper news journalists utilize to communicate scientific and technological information to non-expert audiences. The essence of the survey was to probe whether the scientific and technological information was communicated through the use of narrative techniques to non-expert audience. Consequently, the chapter gives results of the analysis of the journalists' demographic information, the array of narrative techniques, aspects of science and technology information communicated to non-expert audience, and results of the answered research questions.

#### 4.2 Response Rate

The study targeted newspaper news journalists drawn from seven counties, which constitute the North Rift block of Kenya. Data were therefore collected from 64 newspaper news journalists. The response rate to the questionnaires was 100% since all the targeted newspaper news journalists of the four major dailies *Daily Nation*, *The Standard*, *The Star* and *People Daily* were reached. The returned questionnaires were screened and cleaned for missing values and outliers. Descriptive statistics were also captured for purposes of assaying typical response scores and normality.

##### 4.2.1 Missing Value Analysis

Missing data, sometimes known as missing values, relate to data values that are not captured for respective variables under study (Kang, 2013). According to Graham

(2009), the problem of data missing pervades all research, but more importantly, often leads to drawing of skewed conclusions. Besides, Kang (2013) points out that lack of data values could come with reduced statistical power, reduction of representativeness, biased parameter estimation, and making statistical analyses complex. Examination of the variables for missing data revealed that none of the variables had missing data.

#### **4.2.2 Outliers**

Outliers are unusual values in the data, which have the potential to violate statistical assumptions and distort analyses (Felt *et al.* 2017). Outliers are often due to a host of reasons including data entry and measurement errors, sampling problems and natural variations. Outliers were therefore assessed by computing standardized scores for the six variables namely: viewpoint type, viewpoint technique, element of scene construction, scene construction technique, event schedule, and aspects of science and technology. The resulting Z-scores were within the [-3, 3] acceptable interval for lack of outliers (Dienes, 2011).

#### **4.2.3 Descriptive Statistics**

The descriptive statistics presented in Table 4.1 confirmed that viewpoint type scores were normally distributed, with a skewness of -0.344 (standard error = 0.299) and kurtosis of -0.984 (standard error = 0.590); viewpoint technique scores were normally distributed with a skewness of -0.393 (SE = 0.299) and kurtosis of -0.744 (SE = 0.590); scene construction scores were normally distributed with a skewness of -0.993 (SE=0.299) and kurtosis of 1.836 (SE = 0.590); scene construction technique scores were normally distributed with a skewness of -0.577 (SE = 0.299) and kurtosis of

0.519 (SE = 0.590); event schedule scores were normally distributed with a skewness of -0.958 (SE = 0.299) and kurtosis of 1.506 (SE = 0.590); similarly, aspect of science and technology scores were normally distributed with a skewness of -0.156 (SE=0.299) and kurtosis of 0.012 (SE = 0.590).

**Table 4.1: Descriptive Statistics**

Variable	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
1. Viewpoint Type	-.344	.299	-.984	.590
2. Viewpoint Techniques	-.393	.299	-.744	.590
3. Scene Construction Elements	-.993	.299	1.836	.590
4. Scene Construction Techniques	-.577	.299	.519	.590
5. Event Schedule Elements	-.958	.299	1.506	.590
6. Event Schedule Techniques	-.156	.299	.012	.590

### 4.3 Journalists' Demographic Information

Journalists' demographic information was measured in terms of level of education, Newspaper Company, beat reporting, and work experience. Prior evidence has for instance shown that education plays a critical role in the development of journalists (Sandra & Manuel, 2006). Moreover, beat reporting features significantly in the discourse on journalism work routines (McCluskey, 2008) and in newsroom systems (Sandra & Manuel, 2006). Besides, experience and personal attributes emerge as some of the criteria that inform hiring of journalists (Sandra & Manuel, 2006.)

Results of the categorical variables representing background characteristics presented in Table 4.2 revealed the following: level of education among Newspaper reporters appeared to be high. A majority of the journalists (78.1%) were degree holders, while the remaining 21.9% were diploma holders. The distribution of journalists by Newspaper Company was even with 26.6% of the reporters drawn from *The Nation* and *The Standard* respectively; and 23.4% of the journalists coming from both *The*

*Star and People Daily*. Most of the reporters (43.8%) had thematic specialization in science and technology. A sizeable proportion (21.9%) was thematically specialized in money and business, while 17.2% each had a specialist in politics, and law and crime respectively. Experience wise the journalists had the requisite experience. Most of the journalists (46.9%) had an experience of over 5 years, while 32.8% had an experience of 4 years. Cumulatively, 89.1% of the reporters had an experience of more than 2 years.

**Table 4.2: Reporters Demographic Information**

<b>Demography</b>	<b>Category</b>	<b>Number (n)</b>	<b>Percentage (%)</b>
Level of Education	Diploma	14	21.9
	Degree	50	78.1
Newspaper Company	The Nation	17	26.6
	The Standard	17	26.6
	The Star	15	23.4
	People Daily	15	23.4
Beat of Reporting	Science and Technology	28	43.8
	Money and Business	14	21.9
	Politics	11	17.2
	Law and Crime	11	17.2
Working Experience	1 year	3	4.7
	2 years	4	6.3
	3 years	6	9.4
	4 years	21	32.8
	Over 5 yrs	30	46.9

Source: Field Data

These results on the relevance of demographic characteristics of journalists in relation to their practice resonate with those of Kioko (2018) who found out that examination of the demographic characteristics of journalists will help understand the main characteristics of the Kenyan journalists, and whether Kenyan journalists' characteristics match the demographic distribution of other citizens. In addition, Weaver's (2005) experience in studying the journalists led him to conclude that news people are demographically representative of their larger societies. Furthermore, Kioko established that the demographic characteristics of the Kenyan journalists determines how the journalists relate to the rest of the population and thus influencing how they undertake their assignments and tasks. Kioko, for instance, found out that if the journalists' demographics exemplify their elitist stature in society, they are likely to put less emphasis on what affects the plight of the ordinary Kenyans.

Elsewhere on the globe, several studies have investigated who journalists are by asking them about their basic demographic backgrounds (Chen *et al.*, 1998; Henningham and Delano, 1998; Johnstone *et al.*, 1976; Weaver and Wilhoit, 1996; Weaver and Willnat, 2012). This is important because research shows that journalists' demographics are likely to affect how they write their stories (Kioko, 2018).

Adam (2013) established a relationship between the journalists' level of education and their practice. The writer established that the manner in which journalists are trained or educated is incidental to the whole society, which in turn determines the quality of its journalism on offer and practice. The writer concludes that journalists are significantly crucial in the determination of social, political and economic consciousness and how such consciousness is initiated among the public. Therefore, there appears to be a connection between the conception of journalism (as a

profession), the perception of what standard or ideal journalism is and what is considered as a model of journalistic practice. All these can be explained from the perspective of the journalist's level of education and training

Marinho, Sandra, Pinto, Manuel (2006) summarize the relevance of education level and training to journalistic practice. The writers argue that formal education and training of the would be journalists must revolve around media contacts, focusing more on news and how news is sourced and generated and to current affairs and initiating and instilling critical thinking skills in the overall journalistic products. The writers specifically found out that this relationship need not only be developed and escalated to journalism students in their field assignments, but also in the design and development of journalism course content and programs that are meant to consolidate the media skills in the classroom situation and evaluate students based on their capability to develop and write news reports that meet the ideal qualities of news writing.

The findings on beat reporting and their relationship to journalistic practice are in line with those in Marchetti (2005). The writer found out that journalism, based on the media outlets as well as the journalistic human resource, is based on the opposition between a generalized beat and a specialized beat. The writer found out that the continuum between general assignment reporters and specialized (beat) reporters devoted to a particular area (beat) is a general reflection of this trend.

McCluskey (2008) found out that the beat system in journalism establishes work routines in which reporters focus on particular institutions or topic areas. As such, beat reporting is "part of a newsrooms system for beat managing and prioritizing news coverage" (Broadway, 2010, p. 85). Thus, understanding the demographic

characteristics of journalists is therefore critical to the research on the use of narrative techniques in communication of scientific and technological information to non-expert audiences through newspaper news stories

#### **4.4 Scene Construction Techniques, Communication of Scientific and Technological Information**

The first research hypothesis of the study sought to determine the association between journalists' use of scene construction techniques and communication of scientific and technological information to non-expert audiences. This was necessary to establish whether or not the variables scene construction and the communication of scientific and technological information to non-expert audiences are associated. This therefore required the use of the measures of association to establish the existence or lack of it of this association. Scene construction as a research variable was operationalized in terms of scene construction elements namely time and place, dramatic action, conflict resolution through tension and suspense, thematic significance and the goal of the story.

Using a mixed methods approach to analysis, scene construction elements and were first analyzed using descriptive statistics derived from journalists' questionnaire, and then corroborated with newspaper excerpts. This is in line with the mixed method approach adopted for the current study in the previous chapter.

##### **4.4.1 Elements of Scene Construction commonly utilized by Newspaper Reporters**

Scene construction was first operationalized using scene construction elements and then their respective frequencies and percentages determined. The purpose was to

establish whether these elements are utilized in newspaper news stories as indicators of scene construction techniques and whether these elements were used to construct scenes in news stories.

Examination of elements of scene construction commonly utilized by journalists in their news stories revealed a number of elements pursued by the reporters in the North Rift region (Table 4.3). The cumulative percentage agreements indicated that goal of story (79.7%) was the most predominantly utilized scene construction element. However, thematic significance (75.0%), tension and suspense (75.0%) and time and place (70.4%), were also preferred elements of scene construction among the sampled reporters.

**Table 4.3: Scene Construction Types Commonly Utilized by Newspaper Reporters**

	Strongly Disagree		Disagree		Neither agree nor Disagree		Agree		Strongly Agree		Cumulative agreement
	n	%	n	%	n	%	n	%	n	%	
Time and Place	10	15.6	7	10.9	2	3.1	25	39.1	20	31.3	70.4
Dramatic action	7	10.9	6	9.4	8	12.5	20	31.3	23	35.9	67.2
Conflict through tension and suspense	3	4.7	4	6.3	9	14.1	22	34.4	26	40.6	75.0
Thematic Significance	7	10.9	5	7.8	4	6.3	30	46.9	18	28.1	75.0
Goal of story	5	7.8	5	7.8	3	4.7	25	39.1	26	40.6	79.7

Source: Field Data

The findings affirm that news reporters drawn from the North Rift region employ a number of elements to construct scenes in their reporting, being mainly guided by the goal of the story. In so doing, they remain consistent with previous studies, which have shown that journalists tended to combine literary and journalistic elements in their news story writing for a number of reasons depending on the nature of the news story and its purpose (Pottker, 2014).

In excerpt one, *Turkana a Paradise of Fossils Excavators*, the goal of the story as an element of scene construction is to communicate the discovery of the fossil as the rarest of its kind hence named Fossil KNM-WT15000 which ultimately '*helped the world understand the evolution of human beings*' (Daily Nation, August 13,2019). In this story, the antecedent pronoun *it* used at the opening of the story creates suspense and a conflict, which is later resolved in the story when we learn that the antecedent pronoun refers to the discovered rare fossil also known as the *Turkana Boy*. We learn this through the unfolding dramatic action that the journalist builds in the story. The thematic significance of the story is for the reader to understand the rare features of the fossil, and why Lake Turkana is a paradise of fossils

In excerpt Two-*Mystery Rocks Lake Bogoria as geysers Fade*-the goal of the story is to communicate the mystery behind the fading of geysers at Lake Bogoria much to the surprise of the natives, scholars, researchers and residents. The story uses the voice of the witness to aptly capture this mystery:

“There! Over there by the Stone of Sandai, there used to be a geyser jetting over 30 metres high, but it has since been swallowed by the swelling lake. The lake has been swelling and swallowing the geysers,” Yegon, 72, says. (Carolyne Chebet, The Standard, February 15, 2019).

The thematic significance of this story as an element of scene construction is to account for the fading of the geysers an explanation given by Florence Tanui, a geologist:

“Geysers can become extinct or dormant due to installation of geothermal power stations within their vicinity. This is because drilling at the geothermal sites for steam extraction robs the geysers the water and the heat needed to sustain the pressure and may potentially lower the local water table to the point that geysers activity become unstable,” (Carolyne Chebet, The Standard, February 15, 2019).

This expiation helps to resolve the conflict created through suspense in the title and at the beginning of the story. However, drama unfolds through the scenes of the story in time and place.

In excerpt three, the goal of the story is to communicate the invention of the Engine Propelled Planter by Collins Kemboi and Kepher Namu, students at the Rift Valley Technical Training Institute, Eldoret. The story also aims to communicate other inventions such as semi- automatic chain machines and kitchen gardens. The moral of the story is what such scientific and technological inventions and innovations can contribute towards ‘Implementing Sustainable Development Goals for Greener Economies and Societies’, the main theme of the of the 8<sup>th</sup> international conference for the technical and vocational institutions. The opening of the story creates a conflict through suspense that helps to set the dramatic action, which unfolds as the story develops:

The 8th Rift Valley Technical Training Institute (RVTTI) International Conference lived up to its billing as a meeting of innovative minds.

During the three-day forum that started yesterday, youths from the various Technical and Vocational Education and Training (TVET) institutions across the region showcased their inventions aimed at solving contemporary technical challenges. (Fred Kibor, The Standard, June 21<sup>st</sup> 2019).

In excerpt four, the goal of the story is to emphasize the scientific and medical breakthrough at the Moi Teaching and Referral Hospital achieved through kidney transplants and open-heart surgeries. The thematic significance of the story for the non-expert audiences lies in their perception and understanding the hospital as a hub for scientific and medical innovation committed to providing the state-of-the-art medical procedures for referred medical cases.

#### 4.4.2 Scene Construction Techniques

Scene construction techniques as an independent variable was operationalized as use of transition markers, use of multiple paths through the story, switching of voices, use of punctuation marks, and shifting from description to analysis. All these operators and their respective frequencies and percentages are presented in Table 4.4. Data on scene construction as a variable was coded and measured on ordinal scale and descriptive statistics computed.

Results from a comprehensive survey of the techniques that newspaper news journalists in the North Rift region utilize in scene construction to communicate scientific and technological information to non-expert audiences indicated that use of punctuation marks (82.8%); use of transition markers (81.2%), and use of multiple paths (62.5%) were the most commonly used scene construction techniques. Switching voices (54.7%) and shifting from description to analysis were also utilized. These results are summarized in Table 4.4.

**Table 4.4: Scene Construction Techniques Utilized by Newspaper News Journalists**

	Strongly Disagree		Disagree		Neither agree nor Disagree		Agree		Strongly Agree		Cumulative agreement %
	n	%	n	%	n	%	n	%	n	%	
Using transition markers	4	6.3	3	4.7	5	7.8	31	48.4	21	32.8	81.2
Using multiple paths	9	14.1	5	7.8	10	15.6	23	35.9	17	26.6	62.5
Switching Voices	6	9.4	14	21.9	9	14.1	22	34.4	13	20.3	54.7
Use of punctuation marks	3	4.7	5	7.8	3	4.7	38	59.4	15	23.4	82.8
Shifting from description to analysis	14	21.9	14	21.9	7	10.9	17	26.6	12	18.8	45.4

The implication of the results is that Newspaper news journalists drawn from the North Rift region extensively employ punctuation marks to capture mood through the scenes of the story, and to provide more or additional information on science and technology events and situations through the story scenes. The punctuation marks such as commas, semi colons, hyphens and colons are widely used in the stories to describe situations and events thus provide more information to enable non-expert audiences understand the science and technology information relayed in the stories provide for information in descriptions. Transition marks are also common in their narratives to denote change in time from the past to the present and to give cues to the future. Meanwhile, the newspaper news journalists utilize multiple paths through the scenes of the story as a way of offering many avenues through which non-expert audience can understand events and situations as depicted in the stories.

The switching of voices in the story varying from the narrator's (the journalist's voice), to that of the witnesses, through that of experts, scholars, researchers, innovators all work together in unison and singly to deliver information on science and technology to non-expert audiences. Shifting description to analysis in some stories is meant to digest and simplify complex scientific and technological information for non-expert audiences.

In excerpt one, a comma as a punctuation mark has been used 22 times. In excerpt, two a total of 48 times and 18 times in excerpt three. The hyphen is used 4 times in excerpt one. Quotation marks have been used in three paragraphs of the first excerpt, sixteen (16) times in the second excerpt and in eight (08) paragraphs of excerpt three. In excerpt four, the quotation marks are used to attribute important facts of the story (corporate vision and mission) to the CEO of the Moi Teaching and Referral Hospital,

Dr. Aruasa Wilson, who is entitled to speak to the press on all matters concerning the hospital. The time and date markers accompanying the stories help to contextualize the story events and situations. This enables the non-expert audiences to contextualize scientific and technological information.

The current study's findings on scene construction techniques are resonant with those in Knobloch, Patzig, Mende, Hastall, (2004). The writers found out that scene reconstructions enhance readers' visualization of the events to come, making it possible for the readers to be taken to the story world and ultimately observe the events as they happen much as if the events were happening before the readers' eyes. The writers also found out that the way the events are structured in a news story tends to deviate from the structure of the news events in non-narrative news articles; where the latter type is characterized by the inverted pyramid structure in which the most recent events are rendered first, then followed by much less recent events. These findings therefore support the use of scene construction techniques in newspaper news stories, the key purpose is to immerse or transport the readers into the story events, and situations to enable them experience these events up and close. This way, non-expert audiences immerse themselves into the world of scientific and technological information.

On use of transition markers to indicate change of time and place in scenes through the news stories, Sanders (2010) equally found out that news journalists order events signaled by temporal markers (yesterday, later) and verb tense to effect change in time. The writer established that, while the generally accepted tense in news reporting is in the past, news stories more often use the present tense to introduce a feeling of immediacy in the reported events. Consequently, shifts in verb tense mark a shift in

time to a previous event in time line (flashback), or a shift forward in time to an event to come (flash forward). The accompanying photographs to each of the four excerpts depict the scenes through which events in the stories occur. This made it possible through the captions under the photographs.

The news reporters in the excerpts thus construct scenes in two media formats: text, and pictures. Whereas the news descriptions make the non-expert audiences to conceptualize or form a mental image of the scenes, the visual descriptions complete or modify this mental image by relaying what constitutes these scenes from a general perspective. Both techniques lead to the audience's immersion of the story situation in many ways: the textual descriptions invite audience members into the required imagination processes, while the photographs allow the audience to engage into the scenes in the manner in which news actors (journalists, witnesses, experts, researchers, elders and innovators) experienced them.

Photographic scene reconstructions, thus, promote the non-expert audience's imagination of the story's setting and thus provide them with the opportunity to mentally create a world in which to become immersed. Location markers in the captions are used to guide them through this world as the news story unfolds. These markers are used in text showing time and place. The stories' event structures are mainly expressed in text, with a picture reinforcing the narrative time.

#### **4.5 Viewpoint Techniques and Communication of Scientific and Technological Information**

The second research hypothesis of the study sought to establish whether there was a significant relationship between viewpoint techniques and communication of

scientific and technological information. This was necessary so as to determine whether or not viewpoint techniques have a relationship with the communication of scientific and technological information to non-expert audiences. Prior to testing this relationship, viewpoint types were examined as indicators of the presence of viewpoint in newspaper news stories. Quantitative data on each of these indicators was collected and coded then analyzed.

#### 4.5.1 View Point Types

Viewpoint types were assessed in order to gain insight into their nature and how Newspaper news journalists from the study area were utilizing them. Viewpoint types were operationalized as spatial viewpoint, psychological viewpoint and phraseological viewpoint; then their descriptive statistics computed. The cumulative percentage agreement scores presented in Table 4.5 confirm that the three viewpoint types namely; spatial, psychological and phraseological were employed by newspaper reporters from the North Rift region albeit, with marginal differences. Spatial viewpoint (84.4%) was marginally ahead of psychological viewpoint (81.3%) which was itself marginally ahead of phraseological viewpoint (76.6).

**Table 4.5: Viewpoint Types Utilized by Newspaper Reporters**

	Strongly Disagree		Disagree		Neither Agree nor Disagree		Agree		Strongly Agree		Cumulative agreement %
	n	%	n	%	n	%	n	%	n	%	
Spatial Viewpoint	3	4.7	3	4.7	4	6.3	20	31.3	34	53.1	84.4
Psychological Viewpoint	3	4.7	3	4.7	6	9.4	24	37.5	28	43.8	81.3
Phraseological Viewpoint	5	7.8	6	9.4	4	6.3	22	34.4	27	42.2	76.6

From the results, it is apparent that newspaper news journalists under study commonly utilized spatial viewpoint to contextualize the events and situations in the story to place and time settings to enable non-expert audiences understand the scientific and technological information through time and place settings. For example, in excerpt one, the discovery of the rare fossil has been contextualized to Lake Turkana, a paradise of fossils at a time when other previous fossils had been discovered. The title of the story effectively summarizes the time and place setting of the story: *Turkana: A Paradise for Fossil Excavators*. In excerpt two, the title, *Mystery Rocks Lake Bogoria as Geysers Fade*, contextualizes the story to Lake Bogoria at a time when the geysers were fading. This way the readers are able to connect Lake Bogoria and the mysterious fading of geysers.

In excerpt three, the title of the story contextualizes the technological innovations to the Rift Valley Technical Training Institute at a time when the 8<sup>th</sup> International Conference on Implementing Sustainable Development Goals for Greener Economies and Societies, was being held. The dazzling innovations are thus contextualized. The same contextualization continues in excerpt four where the accompanying photograph and the caption below it helps the non-expert audiences understand the medical and scientific breakthroughs at the referral hospital during the first ever-successful open-heart surgery and kidney transplant.

In terms of psychological viewpoint, the journalists narrate the events and situations in the stories through the mind of the characters in the story. The stories are told from the mind of( or psychological viewpoint) of experts and witnesses for example fossil hunters, scientists, scholars e.g. Prof Ngeno paleoanthropologists ( Excerpt one);senior residents for example Richard Yegon, Johana Karatu, geologist, Florence

Tanui, researcher Joseph Edebe (excerpt two); innovators( three) , and CEO MTRH Wilson Aruasa ( excerpt four). Phraseological viewpoint relates to active phrasal verbs adjectives and adverbs that describe the events and situations in the story. All these render the story in active voice.

All these findings are consistent with Farner (2014) who observes that a journalistic narrative can represent a character's spatial viewpoint, psychological viewpoint, and/or phraseological viewpoint (Farner, 2014 qtd. in Kobie, 2016). The writer contends that these various types of viewpoint are achieved through diverse of linguistic features: a character's spatial viewpoint that is signaled by verbs of sight and also by the use of indefinite noun phrases to refer to subjects familiar to the narrator and reader, but unknown to the persona or subject in the news narratives. Similarly, Farner (2014) and Sanford & Emmott, (2012) argue that a character's psychological viewpoint can be signaled not only by verbs of cognition or epistemic modality, but also by thought reports. In this study, viewpoint types and voices are discussed under narration techniques in section 4.5.2.

#### **4.5.2 Viewpoint Techniques**

The study sought to examine the viewpoint techniques utilized by newspaper news journalists and their relationship with the communication scientific and technological information to non-expert audiences. Data on each of these techniques was collected, coded and analyzed then presented on descriptive statistical tables.

Descriptive statistical data on viewpoint techniques utilized by newspaper news journalists from the North Rift region indicate that reporters utilized the five techniques summarized in Table 4.6. Specifically, utilization of tense markers at

79.7% cumulative agreement was the most preferred of the techniques. However, utilization of character's point of view (78.1%); pronominal references (76.6%); verbs of perception (75.0%); and grammatical subjects (71.9%) followed closely in that order.

**Table 4.6: Viewpoint Techniques Commonly Pursued by Newspaper Reporters**

	Strongly Disagree		Disagree		Neither agree nor disagree		Agree		Strongly Agree		Cumulative agreement %
	n	%	n	%	n	%	n	%	n	%	
	Pronominal references	4	6.3	7	10.9	4	6.3	24	37.5	25	
Grammatical Subjects	7	10.9	4	6.3	7	10.9	22	34.4	24	37.5	71.9
Verbs of Perception	6	9.4	5	7.8	5	7.8	26	40.6	22	34.4	75.0
Use of Tense Markers	4	6.3	6	9.4	3	4.7	32	50.0	19	29.7	79.7
Using character's point of View	5	7.8	4	6.3	5	7.8	23	35.9	27	42.2	78.1

The results clearly underscore the perceived importance of viewpoint techniques among newspaper reporters from the region under investigation. They confirm that reporters connect stories between the past, present and future through tense markers, and often describe events through characters' viewpoint, in which case the views of witnesses and other sources of stories are often brought on board. Besides, in commonly utilizing pronominal references, reporters in the region always look towards locating viewpoint to specific sources.

The viewpoint techniques are widely used in the excerpts of the stories carried by the leading newspapers in 2019. The use of pronominal references e.g. *it* to refer to the

Turkana Boy (a fossil), *he* and *she* to refer to people in the stories. The people referred to using pronominal references are witnesses to the events in the story whose accounts complement those of the journalist. Pronominal references, in this case, enhance high accessibility, demonstrating that the main subject in the story is the fulcrum of attention, when compared to the nominal references that mark low accessibility thus indicating that the protagonist is less prominent. All these are used to locate viewpoint to a source. These factors (pronominal and nominal references) thus play a role in ascertaining whether a noun or a pronoun is most relevant to refer to the main character in the story.

Grammatical subjects e.g. *it*, *he*, *she*, *they* in the excerpts relate events through viewpoints of news sources such as the witnesses, experts, and authoritative sources such as Wikipedia. For instance, the journalist in excerpt two about the mystery that rocks Lake Bogoria as geysers fade quotes the meaning of a geyser from Wikipedia:

Wikipedia describes a geyser as a “spring characterized by intermittent discharge of water ejected turbulently and accompanied by steam”. As a fairly rare phenomenon, says Wikipedia, formation of geysers is due to particular hydrogeological conditions that exist only in a few places on earth (The Standard, 5<sup>th</sup> February 2019)

By using pronouns rather than nouns to refer to eyewitnesses, the journalist increases the conceptual proximity between his/her own viewpoint, the eyewitnesses' viewpoints, and the reader's viewpoints. Similarly, by using nouns rather than pronouns to refer to non-eyewitnesses, journalists distance themselves (and hence the readers) from the viewpoints of non-eyewitnesses.

There is also the use of verbs of perception e.g. *imagine*, *feel*, *excited*, *laments* (Yegon in *Fading Geysers*) in excerpt two;

“I have boiled maize and eggs using the geysers and licked the salt residue on the stones to cure stomach aches. I have also been bringing my cattle here to lick salt,” Yegon said.

Amidst the memories tied to almost every aspect of the expansive lake, also lies nostalgia of the once glamorous geysers jetting water so high “that we dared not to go nearby”. Yegon laments that the swelling lake has slowly swallowed the hot springs (The Standard, 5th February 2019).

Tense Markers such as past tense are used to mark shift in time to the past then to the present tense and future tenses to create future status of events. The excerpt on the fading geysers recounts the events through the memory of Yegon, a 72 year-elder who has lived near the Lake for a long time.

In the excerpts too, the events are described through the viewpoints of characters e.g. witnesses, experts, villagers, residents, elders, scholars, authoritative sources for example Wikipedia. Examples; Prof. Isaiah Ng’eno, the director Research and Science at the Turkana Basin Institute in excerpt one; Kenneth Njoroge and Benson Mathenge, the innovators of the semi-automatic chain link machine used to make fencing materials in Excerpt three; the voice of Dr. Wilson Aruasa the CEO of Moi Teaching and Referral Hospital. These findings are consistent with Sanders (2010) showed that viewpoint techniques do in fact occur in news reports especially in newspapers where they are acceptable functional elements.

Sanders, in addition, cites the Mental Space Theory to explain the various linguistic forms of the presence of viewpoint and the implications to accuracy of the information rendered. The writer also discusses how linguistic manifestations guide the reader’s understanding of content by initiating the cognitive construction of mental domains which are attributed to a particular viewpoint and/or to a specific

spatial, temporal or visualized context. This explains the relationship between viewpoint techniques and the validity of the scientific and technological information presented to non-expert audiences in the newspaper news stories. Besides, the viewpoint techniques enhance the non-expert audiences' understanding of the science and technology concepts in the stories.

Sanders *et al.*, (2012) found out that the choices of grammatical subject and pronouns signal the presence of a perceiving character whose observations, while remaining implicit, express a certain viewing direction, thereby appointing a specific character as an explicit subject of consciousness. Sanders *et al.*, (2012) further found out that since the analysis of subject choice and referential expressions showed meaningful patterns in the news narratives, these linguistic choices should be considered significant viewpoint indicators in narrative discourse. The integration of grammatical subjects and references in newspaper news narratives provides for many layers of analyzing viewpoint, which in turn leads to a detailed synthesis on how language determines the readers' cognitive conceptualization and understanding of the scientific, and technological information presented in news stories.

Dancygier (2012) has also established that that journalist strategically uses grammar and reference in news narratives to describe news events from the viewpoints of eyewitnesses. The writer also found out that referential expressions are merely linguistic strategies that journalists can explore to describe news events from the perspectives or viewpoints of eyewitnesses to realize the audience's involvement in the events of the news stories. The other array of linguistic items that are relevant to the rendition of viewpoint are adverbs, demonstratives, negations, prepositions, and connectives.

Kobie (2016) findings summarize the centrality of grammatical subjects, referential expressions and witnesses in news stories containing these techniques. The results of this study demonstrate how the selection of grammatical functions and reference items in journalistic narratives demonstrate viewpoints of [eye]witnesses in relation to events in the stories in many ways: Foremost, [eye]witnesses are commonly situated in the subject position of a clause where compared to non-[eye] witnesses. [Eye] witnesses thus become the most prominent participants in the news story. Secondly, eye witnesses serve as the avenue through which journalists render the news events and, by extension, through which readers conceptualize the events in the story. Third, [eye] witnesses in journalistic news stories are more often referenced to using pronouns more than nouns, whereas [non] eyewitnesses are more often addressed using nouns than pronouns. The writer concludes that this indicates that the [eye] witnesses are cognitively and highly accessible and that the events are related through their viewpoints. Moreover, as the findings of the current study show by using pronouns and not nouns when referring to eyewitnesses, journalists expand the fictional proximity between the created viewpoints, the witnesses' viewpoints, and the readers' viewpoints. Equally, by using nouns and not pronouns in reference to non-witnesses, journalists detach themselves (and hence the readers) from the viewpoints of non-witnesses.

On the use of verbs of perception and cognition as narrative techniques in newspaper news stories, Kobie (2016) found out that Dutch narratives frequently use verbs of perception and cognition to represent the viewpoints of eyewitnesses. This is consistent with the findings on use of verbs of perception and cognition as narrative techniques. As Kobie found out, all perceptions and cognitions occur in the past, but are rendered in the present tense, which is a kin to printed news stories which must be

interpreted from the past. Consequently, this collapses the temporal distance between the basic space and the narrative space. The findings of the current study are therefore in agreement with Dancygier (2012) who found out that the use of verbs of cognition and perception provides an account of the events through the actual, thoughts and perceptions of the witnesses.

In the excerpts under review, verbs of perception and cognition are used to access the viewpoints of the witnesses to the events. Besides, present tense narration of cognition and perception are employed to blend the viewpoints of witnesses with the journalist's viewpoint. Through processes of mixed viewpoints, journalistic narrative techniques invite readers to vicariously experience otherwise distant and scientific and technological news events here and now. Hence, in this context, the journalist de-emphasizes the role of his own viewpoint by presenting the news events through a viewpoint common to those who may be in close access to the events. This enhances the non-expert audience understanding of the scientific and technological information in the stories.

As Dancygier (2012 qtd in Kobie 2016) found out, and which is line with the statistical data, the past tense creates temporal distance between the here and now viewpoints of narrator and reader on the one hand, and the viewpoint of the character on the other, whereas the present tense reduces this distance. In other words, the viewpoints of narrator, character, and reader are all in the tense narratives connected to the temporal dimension. The net effect is to engage the reader, sustain his /her interest throughout the story, and enable the conceptualization of the scientific and technological information.

#### **4.6 Events Scheduling Techniques and Communication of Scientific and Technological Information**

The last research hypothesis sought to establish whether there is a variation between events scheduling techniques and communication of scientific and technological information to non-expert audience. This was necessary so as to determine whether there are not significant variations between the scheduling of events and the communication of scientific and technological information to non-expert audiences. Five items on the newspaper reporter's questionnaire probed reporter's utilization of event structuring /scheduling techniques to communicate science and technology information. Results from a concise survey of reporter's utilization of event scheduling techniques revealed that shifting verb tenses at 79.7% cumulative agreement was by far the most utilized events scheduling technique among newspaper reporters drawn from the North Rift region (Table 4.7). Scheduling events through the character's eye and mind (67.2%) was also commonly used. Reversal of pyramid structure (62.5%); using perspectives of people involved (62.5%) and passing reality through event scheduling (62.5%) were equally weighted.

**Table 4.7: Events Scheduling**

	Strongly Disagree		Disagree		Neither agree nor disagree		Agree		Strongly Agree		Cumulative agreement %
	n	%	n	%	n	%	n	%	n	%	
	Reversal of Pyramid structure	11	17.2	4	6.3	9	14.1	17	26.6	23	
Shifting Verb tenses	5	7.8	2	3.1	6	9.4	29	45.3	22	34.4	79.7
Using perspectives of people involved	10	15.6	4	6.3	10	15.6	21	32.8	19	29.7	62.5
Events through character's eye and mind	4	6.3	3	4.7	14	21.9	28	43.8	15	23.4	67.2
Reality through event scheduling	7	10.9	7	10.9	10	15.6	27	42.2	13	20.3	62.5

The implication of these results is that use of flashbacks is a common phenomenon among the reporters who in doing so, seek to signal a shift in time within their stories. Nevertheless, they also lean so much towards the theory of mind, which entails understanding of events through other people's minds; they prefer to see important information unfold as the story progresses, using perspectives of witnesses to mark changes in events, and putting more emphasis on reality of the situation such that readers can identify with events in the stories.

On the reversal of the traditional pyramid structure as an event schedule technique, the news stories for the four excerpts are rendered in the pyramid structure, where the most important information unfold as the story progresses unlike the traditional inverted pyramid structure where the most important information appears at the beginning of the story, The pyramid structure offers the writers the opportunity to describe and analyze events such that the non-expert reader understands the scientific and technological information unfolding in the stories.

These are the leads for each of the four stories:

### **EXCERPT ONE**

Fossil KNM-WT 15000 is famous the world over.

It is kept under lock and key at the national museum since it is the most complete skeleton of a walking early man — dating between 1.5 million and 1.6 million years.

KNM-WT stands for Kenya National Museum, West Turkana.

At the location it was found in Nariokotome, a stone pillar was erected a few years ago.

KNM-WT 15000 is a significant find that helped the world understand the evolution of human beings.

### **EXCERPT TWO**

Richard Yegon takes slow steps, his jacket hung on his shoulder, as he glances at a swollen Lake Bogoria.

His sight is still good, even under the striking sun rays, despite his age. Using his walking stick, he points at a lone bird perched on a tree sticking out of the water, almost 500 metres away.

“There! Over there by the Stone of Sandai, there used to be a geyser jetting over 30 metres high, but it has since been swallowed by the swelling lake. The lake has been swelling and swallowing the geysers,” Yegon, 72, says.

### **EXCERPT THREE**

*The 8th Rift Valley Technical Training Institute (RVTTI) International Conference* lived up to its billing as a meeting of innovative minds.

During the three-day forum that started yesterday, youths from the various Technical and Vocational Education and Training (TVET) institutions across the region showcased their inventions aimed at solving contemporary technical challenges.

The innovations aptly represented the conference’s theme ‘Implementing the Sustainable Development Goals for green economies and societies, or the TVET Agenda.

## EXCERPT FOUR

Moi Teaching and Referral Hospital has upgraded its health services to include specialised surgeries, kidney transplants and open-heart surgeries.

Last week, the Eldoret-based hospital carried out 20 plastic surgeries on burns' victims, according to chief executive officer Wilson Aruasa. One kidney transplant would be performed weekly.

The hospital has also upgraded and expanded its High Dependency and ICU units to be able to handle emergency cases.

In a normal inverted pyramid structure, one would have expected the leads of each of the four stories to be based on the 5WsH and answer the *what, who, where, when, why* and *how* of the story. However, this is not exactly the case. The lead in the first excerpt only answers the *what* and *where* what then follows is long description of the *what* (the Turkana Boy). The same approach is used in excerpt three where the *what* and *when* is addressed under the lead just as it happens in excerpt four.

The situation in excerpt two is different altogether. The lead opens with the description of one of the witnesses to the events in the story, Richard Yegon, a 72-year-old elder who describes the disappearance or fading of the geysers with nostalgia. The journalist opens the story with the voice of a witness to the fading of geysers who tells *what* has caused the fading of the geysers. What follows is a lengthy flashback of what used to be the geysers of Lake Bogoria. This is a complete departure from the usual inverted pyramid structure in which all the 5WsH of the story are addressed in the lead. The 5WsH carry the most important details of the story under the lead. In this case, however, the most important details keep on unfolding as the story progresses and as the suspense, created at the beginning of the story, unfolds through description and analysis used by the journalist and other characters in the story (researchers, scholars, experts, innovators, elders).

There is also Shifting Verb Tenses- from present to past tense to signal a shift in time. This is done through flashbacks for example in excerpt two through Richard Yegon. In excerpt, the flashback occurs through the voice of Prof. Ng'eno, the director Research and Science at the Turkana Basin Institute. In excerpt three, the voice of the innovators of the mechanized chain link machine takes us back in time to 2016 when they joined Nyandarua Institute of Science and Technology, a time when they conceptualized the idea:

“We joined the institute in 2016 and conceptualized our idea which unfolded after several false starts due to lack of finances to buy materials,” said Njoroge.

Then immediately after, time shifts to the present and this happens through the voice of the same innovators:

“We make and sell the machines to companies that manufacture chain-links and apart from saving trees, the machines are efficient and environmentally friendly,” he said.

Yet the voice of another innovator takes to the present as the story unfolds:

“Majority of small-scale farmers use oxen ploughs while planting cereals which is cumbersome, inefficient and time consuming. Our invention allows a farmer to drive the planter and sow his farm in record time,” said Kemboi.

In excerpt four, the journalist uses tense markers to signal a change in time:

Last week, the Eldoret-based hospital carried out 20 plastic surgeries on burns' victims, according to chief executive officer Wilson Aruasa. One kidney transplant would be performed weekly.

Then thereafter, a shift to the present through the journalist's voice:

The hospital has also upgraded and expanded its High Dependency and ICU units to be able to handle emergency cases.

The number of ICU units has increased from six to 20.

The upgrade is in line with the government's Universal Health Care programme, Dr Aruasa said on Friday.

In addition, the events in the stories are presented from the perspective of people involved in the story, for example, witnesses to events, residents who have witnessed

the change of events and situations; experts who provide more and reliable information on innovations, discoveries and mysteries, authorities like Wikipedia; all these expand our understanding of scientific and technological information as non-expert audiences to the story.

The events in each of the four stories are rendered through the eye and mind of a character a phenomenon based on the theory of the mind: understanding the events and information through another person's mind e.g. that of experts, scholars, elders, authorities and opinion leaders. The verbs of perception such as feel, recall, enables the readers to get a glimpse of what the character in the story thinks or feels. The ability to take another person's perspective, commonly known as theory of mind, is central to human cognition and social interaction (Sodian & Kristen, 2010). With their intricate networks of viewpoint, literary narrative techniques of events representation appeal to our theory of mind in order to understand characters' feelings, motives, and actions (Zunshine, 2006). This suggests that cognitive linguistic approaches to viewpoint such as representation of events from the perspective of the people involved can be relevant to for non-expert audiences in understanding scientific and technological information. This reinforces the authenticity and accuracy of such information. This conforms to the findings of Sanders, & Spooren (2015) who found out those journalists have to attribute information to the sources in order to guarantee the truthfulness of their narratives. The writers in addition established that such attributions, which are often rendered in quotations, transport the reader in the meantime outside the narrative framework so as to show that the journalist and the witness shared information on the news events and in particular in a space between the existence of these events and the journalist rendition of these events.

In terms of Reality through event structuring, the most important events in each of the stories are placed towards the end of the story to capture the attention of the reader and emphasize the reality of the situation in the stories. The stories become more real when the events in the story become familiar with the settings and to the reader; this way the reader is able to identify with the events in the stories.

#### **4.7 Science and Technology Information Communicated by Newspapers Journalists**

Communication of Science and Technology information to non-expert audiences was conceptualized as the dependent variable in the current study. This was necessary so as to ascertain the model for the relationship or lack of it when illustrating how the independent variables-viewpoint techniques, event scheduling techniques and scene construction techniques-are related to the independent variable-communication of scientific and technological information to non-expert audience. Consequently, six items on the reporter's questionnaire were used as indicators of science and technology information that newspaper journalists in the North Rift region employ in their stories. Based on cumulative agreements (Table 4.8), various aspects of science and technology manifest in stories filed by newspaper reporters in the study area.

According to reporters interviewed, scientific innovations (79.7%), geological and volcanic features (65.6%); scientific medical breakthroughs (64.1%); technological innovations (57.9%) and fossil discovery (54.7%) were some of the aspects that make a strong presence in the stories. Scientific inventions (45.3%) feature minimally.

**Table 4.8 Aspects of Scientific and Technological information**

	Strongly Disagree		Disagree		Neither agree nor disagree		Agree		Strongly Agree		Cumulative agreement %
	n	%	n	%	n	%	n	%	n	%	
Discovery of fossils	7	10.9	8	12.5	14	21.9	24	37.5	11	17.2	54.7
Scientific innovations	3	4.7	4	6.3	6	9.4	33	51.6	18	28.1	79.7
Scientific Inventions	9	14.1	10	15.6	16	25.0	14	21.9	15	23.4	45.3
Technological innovations	7	10.9	6	9.4	14	21.9	25	39.1	12	18.8	57.9
Geological and volcanic features	6	9.4	4	6.3	12	18.8	29	45.3	13	20.3	65.6
Scientific medical breakthroughs	8	12.5	5	7.8	10	15.6	19	29.7	22	34.4	64.1

The study affirmed that the North Rift region has an avalanche of activities loaded with scientific and technological aspects, which are often communicated through newspaper stories. Indeed, newspaper excerpts featuring various scientific and technology aspects as shown in the following photos corroborate these results.



Turkana: A paradise for fossil excavators  
Tuesday August 13 2019

Mystery rocks Lake Bogoria as geysers fade By CAROLINE CHEBET | February 5th 2019



Dazzling array of inventions premier at technical fete By FRED KIBOR | June 21st 2019

Moi Teaching and Referral Hospital CEO Wilson Aruasa in Eldoret on March 3,2019  
Image: BY MATHEWS NDANYI

*Photo 4.1*

## **4.8 Inferential Analyses**

The study sought to test whether journalists' use of scene construction techniques and viewpoint techniques in news stories were not significantly associated with the communication of scientific and technological information; and whether events scheduling techniques had any significant variation with the communication of scientific and technological information to non-expert audiences. Chi-square test for association was therefore employed to establish the existence of associations, and the independent samples t-test, was used to test variability in events scheduling techniques and communication of scientific and technological information to non-expert audience.

### **4.8.1 Data Transformations**

Prior to testing for association, data were first transformed by re-coding the variables into new dichotomous variables with only two options of disagreement or agreement in order to satisfy the criteria of a 2x2 categorical cross tabulations. The old response scores of 1, 2 and 3 were transformed into disagreements while the old scores '4' and '5' were re-coded into agreement. This transformation was conducted for all the variables under study.

### **4.8.2 Relationship between Scene Construction Techniques and Communication of Scientific and Technological Information**

The null hypothesis was this study was: There was no significant association between scene construction techniques and the communication of scientific and technological information to non-expert audiences. The study therefore sought to test this null

hypothesis so as to accept or reject it. The two variables are categorical and dichotomous-existing in two categories. This necessitated the use of Chi Square test of association.

Having transformed the categorical variables into dichotomous variables (each having only two groups), a 2x2 cross tabulation was now possible allowing for chi-square test of association. Prior to this test, the assumption of all cells having expected counts greater than five was first assessed. A chi-square test for association was conducted between scene construction and communication of scientific and technological information. Chi-Square Test of Association between two variables is appropriate in categorical data for two independent variables, and when the researcher wants to establish if there is an association between them. Data on the variables to be subjected to Chi Square test of association must be categorical. All expected cell frequencies were greater than five (Table 4.9). The assumption was therefore met.

**Table 4.9: Testing the Assumption of all Cells having Expected Counts greater than 5**

			Communication of Scientific and Technological Information	
			Disagreement	Agreement
Scene Construction Techniques	Disagreement	Count	16	12
		Expected Count	10.5	17.5
	Agreement	Count	8	28
		Expected Count	13.5	22.5

From the tabulated results, it can be observed that the Chi Square value  $\chi^2 (1) = 8.195$  is greater than the significance value ( $p=0.004$ ). This means that the Chi Square value is outside the range of acceptance or significance hence the null hypothesis is rejected and the alternate hypothesis accepted. This means that there is a relationship between the two variables.

Results of the chi-square tests further indicated that there was a statistically significant relationship between newspaper news journalists' use of scene construction techniques and their communication of scientific and technological information,  $\chi^2 (1) = 8.195$ ,  $p=0.004$ .

**Table 4.10: Chi-Square Tests**

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	8.195 <sup>a</sup>	1	.004	.009	.005	
Continuity Correction <sup>b</sup>	6.772	1	.009			
Likelihood Ratio	8.298	1	.004	.009	.005	
Fisher's Exact Test				.009	.005	
Linear-by-Linear Association	8.067 <sup>c</sup>	1	.005	.009	.005	.004

N of Valid Cases 64

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.50.

b. Computed only for a 2x2 table

c. The standardized statistic is 2.840.

An examination of the Phi ( $\phi$ ) measure of strength of relationship (Table 4.11) confirmed that there was a moderately strong relationship between use of scene construction techniques and communication of scientific and technological information,  $\phi = 0.358$ ,  $p=0.004$ .

**Table 4.11: Symmetric Measures**

		Value	Approximate Significance	Exact Significance
Nominal by	Phi	.358	.004	.009
Nominal	Cramer's V	.358	.004	.009
N of Valid Cases		64		

The Cramer's V value (0.358) is higher than the significance value ( $p=0.004$ ), meaning that the V value is outside the significance region. Thus, the null hypothesis that there is no relationship between use of scene construction techniques and communication of scientific and technological information is rejected since there is a strong relationship. This therefore establishes that there is a strong relationship between scene construction techniques and the communication of scientific and technological information to non-expert audiences.

In the questionnaire, the independent variable, scene construction, was operationalized in terms of operationalized in terms of scene construction elements namely time and place, dramatic action, conflict resolution through tension and suspense, thematic significance and the goal of the story. These elements were rendered in a Likert Scale and the respondents were asked to rate the elements on the scale of 1 to 5. The descriptive statistics has detailed the findings on each of this elements. The purpose of descriptive statistics was to describe statistically and establish whether these elements are utilized in newspaper news stories as indicators of scene construction techniques and whether these elements were used to construct scenes in news stories.

In the first story, *Turkana a Paradise of Fossils Excavators*, the goal of the story as an element of scene construction is to invite the lay audience to understand the goal of

the story; that is, to bring into their (lay audience) attention the discovery of the fossil as the rarest of its kind hence named Fossil KNM-WT15000 which ultimately '*helped the world understand the evolution of human beings*' (Daily Nation, August 13,2019). In this story, the antecedent pronoun *it* used at the opening of the story creates suspense and a conflict, which is later resolved in the story when we learn that the antecedent pronoun refers to the discovered rare fossil also known as the *Turkana Boy*. We learn this through the unfolding dramatic action that the journalist builds in the story. The thematic significance of the story is for the non-expert audience to understand and conceptualize the rare features of the fossil, and understand why Lake Turkana is a paradise of fossils. Thus the qualitative findings from the stories are useful in discussing the patterns about the descriptive statistics about the elements of scene construction by providing an explanation on the goal of the elements of scene construction in the news story and how they invite the non-expert audience in understanding the goal of the story, something the descriptive statistics alone, do not explain. Thus this gap in quantitative data was filled by the qualitative data from the news stories, in the second news story, *Mystery Rocks Lake Bogoria as geysers Fade*, the goal of the story is to communicate to the non-expert audience, the mystery behind the fading of geysers at Lake Bogoria. The explanation of this mystery cannot be adequately captured by the descriptive statistics arising from data collected using the questionnaire. The researcher thus relied on the qualitative data by analyzing the story's main goal in respect to the communication of the science behind the fading of the geysers and unravel the mystery which over the years has puzzled the natives, scholars, researchers and residents. The story uses the voice of the witness to aptly capture this mystery. Here is how the witness describes the reason for the disappearance of the geysers:

“There! Over there by the Stone of Sandai, there used to be a geyser jetting over 30 metres high, but it has since been swallowed by the swelling lake. The lake has been swelling and swallowing the geysers,” Yegon, 72, says. (Carolyne Chebet, *The Standard*, February 15, 2019)

Thus the lay audience is invited to understand the mystery of the fading geysers through the voice of the witness. Thus the scene on fading geysers is constructed through the eyes and consciousness of the witness, Yegon, a 72-year old elder who has been witnessing the fading of geysers at the lake for a long time.

In addition, the thematic significance of this story as an element of scene construction is to provide a scientific basis for the fading of the geysers, an explanation given by Florence Tanui, a geologist:

“Geysers can become extinct or dormant due to installation of geothermal power stations within their vicinity. This is because drilling at the geothermal sites for steam extraction robs the geysers the water and the heat needed to sustain the pressure and may potentially lower the local water table to the point that geysers activity become unstable,” (Carolyne Chebet, *The Standard*, February 15, 2019).

This scientific explanation helps to resolve the conflict created through suspense in the title and at the beginning of the story, that is, the reason why there is mystery around fading geysers. Thus the non-expert audience is invited to understand this mystery from the expert information provided by the geologist. This expert information would not have been provided by relying on the statistical patterns of the scene construction elements. This gap was thus bridged by inferring to the qualitative data in the news stories. This way, non-expert audiences have an opportunity to visualize the scene on fading geysers, the reason and science behind it. This information is thus validated by the expert.

In excerpt three, the goal of the story is to communicate to the non-expert audience the invention of the Engine Propelled Planter by Collins Kemboi and Kepher Namu,

students at the Rift Valley Technical Training Institute, Eldoret. The story also aims to communicate other inventions such as semi- automatic chain machines and kitchen gardens. The photos about the invention help to create the scene about the inventions and serve as evidence of the inventions. Thus the lay audience is better able to understand these inventions in terms of their appearance and connect the appearance to use. The moral of the story is what such scientific and technological inventions and innovations can contribute towards ‘Implementing Sustainable Development Goals for Greener Economies and Societies’, the main theme of the of the 8<sup>th</sup> international conference for the technical and vocational institutions. Thus the lay audience is better able to connect the inventions with the theme of the conference and the contribution those inventions have towards economic development.

Thus through scene construction of the inventions and their demonstration, the story engages the lay audience through creation of suspense at the beginning of the story. The opening of the story creates a conflict through suspense that helps to set the dramatic action, which unfolds as the story develops:

The 8th Rift Valley Technical Training Institute (RVTTI) International Conference lived up to its billing as a meeting of innovative minds.

During the three-day forum that started yesterday, youths from the various Technical and Vocational Education and Training (TVET) institutions across the region showcased their inventions aimed at solving contemporary technical challenges. (Fred Kibor, The Standard, June 21<sup>st</sup> 2019).

Thus the qualitative data from the story helps capture the scenes constructed through the unique inventions and the science behind them. The scene created in the story about the inventions help the non-expert audience to link the inventions with theme of the conference and the overall contribution of such inventions towards sustainable development. This creates the context for engaging the non-expert audiences in the

story such that the audience gets to understand how the story relates to them in their real lives. Thus a combination of both qualitative and quantitative data was essential not only in lay audience engagement with matters science and technology but also in contextualizing the scientific and technological inventions to their lives in society in terms of how such inventions can improve the quality of their lives. This way, inventions are made more relevant to the non-expert audiences.

In excerpt four, the goal of the story is to contextualize the scientific and medical breakthrough at the Moi Teaching and Referral Hospital realized through kidney transplants and open-heart surgeries. The thematic significance of the story is for the non-expert audiences understanding the hospital as a hub for scientific and medical innovation committed to providing the state-of-the-art medical procedures for referred. The scenery created through the description of the medical discoveries helps to influence the lay audience about the perception of the medical facility. The breakthroughs in terms of kidney transplants and open heart surgery are communicated through an expert who happens to be the CEO of the hospital. Communicating such information through an expert helps the lay audience to trust such public information about science and technology.

Thus scene construction as journalistic narrative technique in this study was analyzed through qualitative and quantitative techniques relying on qualitative and quantitative data. The quantitative data gaps, for example the explanation on the trends and statistical figures, were bridged by relying on the qualitative information from the news stories.

### 4.8.3 Association between viewpoint techniques and communication of scientific and technological information.

The second null hypothesis for the study was stated as: There was no significant association between viewpoint techniques and the communication of scientific and technological information to non-expert audiences. The study therefore sought to test this hypothesis so as to accept or reject the null hypothesis.

A chi-square test of association was conducted between use of viewpoint techniques and communication of scientific and technological information. This was because data on the two variables was categorical, ranked and measured on ordinal scale. All expected cell frequencies were again greater than five (Table 4.12) indicating that the assumption of all cells having expected counts greater than five was met.

**Table 4.12 Association between viewpoint techniques and communication of scientific and technological information**

				Communication of Scientific and Technological Information	
				Disagreement	Agreement
Viewpoint Techniques	Disagreement	Count	13	9	
		Expected Count	8.3	13.8	
	Agreement	Count	11	31	
		Expected Count	15.8	26.3	

Since the Chi Square value  $\chi^2 (1) = 6.668$  was higher than the significance value  $p=0.010$ , it therefore means the Chi Square value is outside the region of acceptance

or significance thus the null hypothesis is rejected and the alternate hypothesis accepted.

The chi-square tests output therefore reveal that there was a statistically significant association between news reporters use of viewpoint techniques and their communication of scientific and technological information,  $\chi^2 (1) = 6.668$ ,  $p=0.010$  (Table 4.13).

**Table 4.13: Chi-Square Tests**

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)	Point Probability
Pearson Chi-Square	6.668 <sup>a</sup>	1	.010	.015	.011	
Continuity Correction <sup>b</sup>	5.338	1	.021			
Likelihood Ratio	6.610	1	.010	.015	.011	
Fisher's Exact Test				.015	.011	
Linear-by-Linear Association	6.564 <sup>c</sup>	1	.010	.015	.011	.008

N of Valid Cases 64

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 8.25.

b. Computed only for a 2x2 table

c. The standardized statistic is 2.562.

The Phi ( $\phi$ ) measure of strength of association (Table 4.14) confirmed that the association between use of viewpoint techniques and communication of scientific and technological information was moderately strong,  $\phi =0.323$ ,  $p=0.010$ .

**Table 4.14: Symmetric Measures**

		Value	Approximate Significance	Exact Significance
Nominal by Nominal	Phi	.323	.010	.015
	Cramer's V	.323	.010	.015
N of Valid Cases		64		

Since the V value (0.323) is higher than the significance level value ( $p=0.010$ ), there is association between the newspaper news journalists' use of viewpoint techniques and the communication of scientific and technological information. Thus, the null

hypothesis is rejected and the research established an association between the use of viewpoint techniques and the communication of scientific and technological information with non-expert audiences.

An analysis of the news stories established the presence of viewpoint techniques. Thus the qualitative information was relied on to explain the use of viewpoint techniques captured through descriptive statistics since the descriptive statistics merely described the data without explaining the reasons for the patterns and trends on the data about viewpoint techniques.

On a qualitative analysis of the news stories, it was established that viewpoint techniques are widely used in the stories carried by the leading newspapers in 2019. For instance, the use of pronominal references for it to refer to the Turkana Boy (a fossil), *he* and *she* to refer to people in the stories. It has been established from the analysis that the people referred to using pronominal references are witnesses to the events in the story whose accounts complement those of the journalist. Pronominal references, in this case, enable the non-expert audience to gain accessibility into the story by enabling the lay audience visualize that the main subject in the story is the fulcrum of attention, when compared to the nominal references that mark low accessibility thus indicating that the protagonist is less prominent. All these are used to locate viewpoint to a source. Therefore, the lay audience is given an avenue through which they can locate viewpoint in the news stories to a particular source and be able to evaluate the credibility of such source in terms of communicating scientific and technological information. Besides, the non-expert audience is enabled through pronominal and nominal references in ascertaining whether a noun or a pronoun is most relevant to refer to the main character in the story.

Grammatical subjects for example. *it, he, she, they* in the excerpts relate events through viewpoints of news sources such as the witnesses, experts, and authoritative sources such as Wikipedia. This information is useful in explaining the statistical data patterns on viewpoint techniques manifestations as indicated on the questionnaire. For instance, the journalist in excerpt two about the mystery that rocks Lake Bogoria as geysers fade cites the meaning of a geyser from Wikipedia:

Wikipedia describes a geyser as a “spring characterized by intermittent discharge of water ejected turbulently and accompanied by steam”. As a fairly rare phenomenon, says Wikipedia, formation of geysers is due to particular hydrogeological conditions that exist only in a few places on earth (The Standard, 5<sup>th</sup> February 2019)

This citation is useful in validating the scientific information communicating through news stories. Such validation assures the non-expert audience that the information communicated about science and technology can be trusted since it is obtained from trusted sources. By improving such credibility therefore, the non-expert audiences associate themselves with such information.

By using pronouns rather than nouns to refer to eyewitnesses, the journalist enables the non-expert audience to increase the conceptual proximity between his/her own viewpoint, the eyewitnesses’ viewpoints, and the reader’s viewpoints. The increase in proximity makes the communication of scientific and technological information more visible and within the consciousness of the non-expert audience. Similarly, by using nouns rather than pronouns to refer to non-eyewitnesses, journalists distance themselves (and hence the readers) from the viewpoints of non-eyewitnesses. This way, the non-expert audience is better able to draw a distinction between the various viewpoints and determine which scientific and technological information is relayed

from the journalist and which one comes from the expert witness and non-expert witness. This way, the non-expert audience is protected against misinformation.

The analysis of qualitative data has also revealed the use of verbs of perception such as imagine, feel, excited, laments. Here is how Yegon, the witness in excerpt two observes:

“I have boiled maize and eggs using the geysers and licked the salt residue on the stones to cure stomach aches. I have also been bringing my cattle here to lick salt,” Yegon said.

Amidst the memories tied to almost every aspect of the expansive lake, also lies nostalgia of the once glamorous geysers jetting water so high “that we dared not to go nearby”. Yegon laments that the swelling lake has slowly swallowed the hot springs (The Standard, 5th February 2019).

A qualitative analysis of the news stories enables the researcher to identify tense markers as one of the ways in which viewpoint techniques such, as an independent variable, was operationalized. Tense Markers such as past tense have been used in the news stories to enable non-expert audiences understand and conceptualize a shift in time to the past then to the present tense and future tenses so as to understand the time status of events in the story This enables the contextualization of the science and technology information relayed through time. The excerpt on the fading geysers recounts the events through the memory of Yegon, a 72 year-elder who has lived near the Lake for a long time. The non-expert audience is therefore given an avenue to which to follow the events relating to the communication of science behind the fading geysers from the viewpoint of the witness. On the other hand, the journalist has relied on the viewpoint of the witness to render the events of the story concerning the fading geysers through a witness. The witness is credible enough to render the information about the fading geysers since he has witness this first-hand through a long period of time.

In the other excerpts too, the events are described through the viewpoints of characters, for example, witnesses, experts, villagers, residents, elders, scholars, authoritative sources for example Wikipedia. Examples; Prof. Isaiah Ng'eno, the director Research and Science at the Turkana Basin Institute in excerpt one; Kenneth Njoroge and Benson Mathenge, the innovators of the semi-automatic chain link machine used to make fencing materials in Excerpt three; the voice of Dr. Wilson Aruasa the CEO of Moi Teaching and Referral Hospital. This was necessary so as to reinforce the credibility of the science and technology information communicated to non-expert audience. This also complements the journalist perspectives thus expanding the perspectives from which the communication of scientific and technological information is rendered. Thus the qualitative and quantitative data converged to expand the perspectives from which information about science and technology was relayed to the non-expert audiences. Besides, this duo approach enables the non-expert audience to evaluate the nature of scientific and technological information on their end and make decisions on its trustworthiness and credibility thus engaging the lay audience in the process of science communication. These findings are reinforced by Sanders (2010) who found that viewpoint techniques do in fact occur in news reports especially in newspapers where they are acceptable functional elements.

Sanders, in addition, makes reference to the Mental Space Theory in an effort to explain the various linguistic manifestations of view viewpoint and their implications to accuracy of the information rendered. The writer also discusses how linguistic manifestations guide the reader's [non-experts included] understanding of content [science and technology for the current study] by initiating the cognitive construction of mental domains which are attributed to a particular viewpoint and/or to a specific spatial, temporal or visualized context. This explains the relationship between

viewpoint techniques and the validity of the scientific and technological information presented to non-expert audiences in the newspaper news stories. Besides, the viewpoint techniques enhance the non-expert audiences' understanding of the science and technology concepts in the stories

The qualitative and quantitative findings on viewpoint techniques and the communication of science and technology to non-expert audiences are also supported by Sanders *et al.*, (2012) who found out that the choices of grammatical subject and pronouns signal the presence of a perceiving character whose observations, while remaining implicit, express a certain viewing direction, thereby appointing a specific character as an explicit subject of consciousness. Sanders *et al.*, (2012), in addition, found out that since the analysis of subject choice and referential expressions showed meaningful patterns in the news narratives, these linguistic choices should be considered significant viewpoint indicators in narrative discourse. This thus explains why use of pronominal references, grammatical subjects, use of verbs of cognition and tense markers were all used as operational indicators of viewpoint in this study. The same are used in the questionnaire that was used to collect quantitative data from the respondents in this study. The integration of grammatical subjects and references in newspaper news narratives provides for many layers of analyzing viewpoint, which in turn leads to a detailed synthesis on how language determines the non-expert audience cognitive conceptualization and understanding of the scientific, and technological information presented in newspaper news stories.

Dancygier (2012) also found out that that journalists purposely utilize grammar and reference structures in news narratives to describe news events [scientific and technological events included] from the viewpoints of eyewitnesses. The writer

established that referential expressions are merely linguistic strategies that journalists can utilize to describe news events from the perspectives or viewpoints of eyewitnesses to realize the audience's involvement in the events of the news stories. The other array of linguistic items that are relevant to the rendition of viewpoint are adverbs, demonstratives, negations, prepositions, and connectives.

Kobie (2016) findings summarize the indicators of viewpoint that were employed the questionnaire used to collect quantitative data for the current. In addition, these indicators were manifested in the news stories contained in the appendix section of this document. These indicators are use of grammatical subjects, referential expressions and witnesses in news stories containing these techniques. The results of this study thus demonstrate how the selection of grammatical functions and reference items in journalistic narratives demonstrate viewpoints of [eye] witnesses in relation to communication of scientific and technological information to non-experts in the selected stories in many ways: Foremost, [eye] witnesses are commonly situated in the subject position of a clause where they are compared to non-[eye] witnesses. [Eye] witnesses thus become the most prominent participants in the news story in matters communication of science and technology. Secondly, eye witnesses serve as the avenue through which journalists render the science and technology and, by extension, through which non-experts conceptualize the scientific and technological information. Third, [eye] witnesses in journalistic news stories attached in the appendix are more often referenced to using pronouns more than nouns, whereas [non] eyewitnesses are more often addressed using nouns than pronouns. Kobie thus concludes that the [eye] witnesses are cognitively and highly accessible and that the events are related through their viewpoints. Moreover, as the findings of the current study show that by using pronouns and not nouns when referring to eyewitnesses,

journalists expand the fictional proximity between the created viewpoints, the witnesses' viewpoints, and the non-expert viewpoints. Equally, by using nouns and not pronouns in reference to non-witnesses, journalists detach themselves (and hence the readers) from the viewpoints of non-witnesses.

On the use of verbs of perception and cognition as narrative techniques in newspaper news stories, Kobie (2016) found out that Dutch narratives frequently use verbs of perception and cognition to represent the viewpoints of eyewitnesses. This is consistent with the findings on use of verbs of perception and cognition as narrative techniques. As Kobie found out, all perceptions and cognitions occur in the past, but are rendered in the present tense, which resembles printed news stories which must be interpreted from the past. Consequently, this collapses the temporal distance between the basic space and the narrative space. The findings of the current study are therefore in agreement with Dancygier (2012) who found out that the use of verbs of cognition and perception provides an account of the events through the actual, thoughts and perceptions of the witnesses.

In the excerpts that were attached and reviewed for this study, verbs of perception and cognition are used to access the viewpoints of the witnesses to the events. Besides, present tense narration of cognition and perception are employed to blend the viewpoints of witnesses with the journalist's viewpoint. Through processes of mixed viewpoints, journalistic narrative techniques invite non-expert audiences to experience otherwise distant and scientific and technological news events here and now. Hence, in this context, the journalist de-emphasizes the role of his own viewpoint by presenting the news events through a viewpoint common to those who

may be in close access to the events. This enhances the non-expert audience understanding of the scientific and technological information in the stories.

As Dancygier (2012 qtd in Kobie 2016) found out, and which is line with the statistical data analysed for this study, the past tense creates temporal distance between the here and now viewpoints of narrator and reader on the one hand, and the viewpoint of the character on the other, whereas the present tense reduces this distance. In other words, the viewpoints of narrator, character, and reader are all in the tense narratives connected to the temporal dimension. The net effect is to engage the non-expert reader, sustain his /her interest throughout the story, and enable the conceptualization of the scientific and technological information.

#### **4.8.4 Variation between Events Scheduling Techniques and Communication of Scientific and Technological Information**

The third and final null hypothesis for the study was stated as: There are no significant variations between event scheduling techniques and the communication of scientific and technological information to non-expert audiences. The study therefore set out to test this hypothesis so as to accept or reject it.

Prior to testing for significant differences between events scheduling and communication of scientific and technological information, the sums of response scores across each of the two variables were obtained and then their mean scores were computed. An independent samples t-test was then conducted to examine if there were significant differences in the mean scores (Table 4.15). There was homogeneity of variance for the scores on event scheduling and communication of scientific and

technological information as assessed by Levene's test for equality of variance ( $p=.337$ ).

**Table 4.15: Independent Samples Test**

Events Scheduling Vs Communication	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.930	.337	.333	126	.739	.063	.187	-.309	.434
Equal variances not assumed			.333	123.945	.739	.063	.187	-.309	.434

Based on non-violation of homogeneity of variance, equal variances were assumed, and the first row was then used for further interpretations. Event scheduling mean score was 0.063 (95% CI, -0.309 to 0.434) higher than communication science and technology information. There was no statistically significant difference in mean scores between event scheduling and communication of scientific and technological information,  $t(126) = 0.333$ ,  $p=0.739$ .

The implication of these results is that the events scheduling techniques had no variation with the communication of scientific and technological information to non-expert audiences. Therefore, there are no significant variations between event scheduling techniques and the communication of scientific and technological information to non-expert audiences.

The results from inferential statistics have established a relationship between event schedules and the communication of scientific and technological information to non-expert audiences. Five items on the questionnaire probed reporter's utilization of event structuring /scheduling techniques to communicate science and technology information. Results from a concise survey of reporter's utilization of event scheduling techniques revealed that shifting verb tenses at 79.7% cumulative agreement was by far the most utilized events scheduling technique among newspaper reporters drawn from the North Rift region (Table 4.7). Scheduling events through the character's eye and mind (67.2%) was also commonly used. Reversal of pyramid structure (62.5%); using perspectives of people involved (62.5%) and passing reality through event scheduling (62.5%) were equally weighted. These descriptive statistical findings were supported by the findings from the analysis of copies of news stories selected for the current study.

A combination of qualitative and quantitative data results suggest that the use of flashbacks is a common phenomenon among the reporters who in doing so, seek to signal a shift in time within their stories. Nevertheless, they also lean so much towards the Theory of the Mind, which entails understanding of events through other people's minds. Thus non-experts prefer to see scientific and technological information unfold as the story progresses, using perspectives of witnesses to mark changes in events, and putting more emphasis on reality of the situation such that readers can identify with events in the stories.

On the reversal of the traditional pyramid structure as an event schedule technique, the news stories for the four excerpts are rendered in the pyramid structure, where the most important information unfold as the story progresses unlike the traditional

inverted pyramid structure where the most important information appears at the beginning of the story, The pyramid structure offers the writers the opportunity to describe and analyze events such that the non-expert reader understands the scientific and technological information unfolding in the stories.

In a normal inverted pyramid structure, one would have expected the leads of each of the four stories to be based on the 5WsH and answer the *what, who, where, when, why* and *how* of the story. However, this is not exactly the case. The lead in the first excerpt only answers the *what* and *where* what then follows is long description of the *what* (the Turkana Boy). The same approach is used in excerpt three where the *what* and *when* is addressed under the lead just as it happens in excerpt four.

The situation in excerpt two is different altogether. The lead opens with the description of one of the witnesses to the events in the story, Richard Yegon, a 72-year-old elder who describes the disappearance or fading of the geysers with nostalgia. The journalist opens the story with the voice of a witness to the fading of geysers who tells *what* has caused the fading of the geysers. What follows is a lengthy flashback of what used to be the geysers of Lake Bogoria. This is a complete departure from the usual inverted pyramid structure in which all the 5WsH of the story are addressed in the lead. The 5WsH carry the most important details of the story under the lead. In this case, however, the most important details keep on unfolding as the story progresses and as the suspense, created at the beginning of the story, unfolds through description and analysis used by the journalist and other characters in the story (researchers, scholars, experts, innovators, elders).

The study established a trend relating to shift in verb tenses after a qualitative analysis of the stories. Shifting Verb Tenses- from present to past tense signals a shift in time.

This is done through flashbacks for example in excerpt two through Richard Yegon. In excerpt, the flashback occurs through the voice of Prof. Ng'eno, the director Research and Science at the Turkana Basin Institute. In excerpt three, the voice of the innovators of the mechanized chain link machine takes us back in time to 2016 when they joined Nyandarua Institute of Science and Technology, a time when they conceptualized the idea:

“We joined the institute in 2016 and conceptualized our idea which unfolded after several false starts due to lack of finances to buy materials,” said Njoroge.

Then immediately after, time shifts to the present and this happens through the voice of the same innovators:

“We make and sell the machines to companies that manufacture chain-links and apart from saving trees, the machines are efficient and environmentally friendly,” he said.

Yet the voice of another innovator takes to the present as the story unfolds:

“Majority of small-scale farmers use oxen ploughs while planting cereals which is cumbersome, inefficient and time consuming. Our invention allows a farmer to drive the planter and sow his farm in record time,” said Kemboi.

In excerpt four, the journalist uses tense markers to signal a change in time:

Last week, the Eldoret-based hospital carried out 20 plastic surgeries on burns' victims, according to chief executive officer Wilson Aruasa. One kidney transplant would be performed weekly.

Then thereafter, a shift to the present through the journalist's voice:

The hospital has also upgraded and expanded its High Dependency and ICU units to be able to handle emergency cases.

The number of ICU units has increased from six to 20.

The upgrade is in line with the government's Universal Health Care programme, Dr Aruasa said on Friday.

In addition, the events in the stories are presented from the perspective of people involved in the story, for example, witnesses to events, residents who have witnessed the change of events and situations; experts who provide more and reliable information on innovations, discoveries and mysteries, authorities like Wikipedia; all these expand our understanding of scientific and technological information as non-expert audiences to the story.

The events in each of the four stories are rendered through the eye and mind of a character a phenomenon based on the theory of the mind: understanding the events and information through another person's mind e.g. that of experts, scholars, elders, authorities and opinion leaders. The verbs of perception such as feel, recall, enables the readers to get a glimpse of what the character in the story thinks or feels.

The ability to take another person's perspective, commonly known as Theory of the Mind, is central to human cognition and social interaction (Sodian & Kristen, 2010). With their intricate networks of viewpoint, literary narrative techniques of events representation appeal to the non-expert audience's mind in order to understand characters' feelings, motives, and actions (Zunshine, 2006). This suggests that cognitive linguistic approaches to scheduling events of events from the perspective of the people involved can be relevant to for non-expert audiences in understanding scientific and technological information. This reinforces the authenticity and accuracy of such information. This conforms to the findings of Sanders, & Spooren (2015) who found out those journalists have to attribute information to the sources in order to guarantee the truthfulness of their narratives. The writers in addition established that such attributions, which are often rendered in quotations, transport the reader in the meantime outside the narrative framework so as to show that the journalist and the

witness shared information on the news events and in particular in a space between the existence of these events and the journalist rendition of these events.

In event structuring/scheduling, the most important events in each of the stories are placed towards the end of the story to capture the attention of the reader and emphasize the reality of the situation in the stories. The stories become more real when the communication of scientific and technological information in the story becomes familiar with the settings and to the non-expert audience; this way the reader is able to identify with the events in the stories.

#### **4.8.5 Modeling Scene Construction, Viewpoint Techniques and Event Schedules as Predictors of Communication of Scientific and Technological Information**

Taking cognizance of the findings showing existence of positive and significant relationships between scene construction techniques and communication of scientific and technological information on the one hand; and viewpoint techniques and communication of scientific and technological information on the other, the researcher sought to determine the direct impact of scene construction techniques and viewpoint techniques on communication of scientific and technological information. A multiple regressions analysis was consequently used to model this relationship.

Under this approach, respective variables were transformed into mean scores. Communication of scientific and technological information was entered as the dependent variable, while scene construction techniques, viewpoint techniques and event scheduling techniques were entered as the independent variables respectively. From the model summary (Table 4.16),  $R^2$  for the overall model was 23.6% with an adjusted  $R^2$  of 21.1% indicating a medium size effect according to Cohen (1988).

**Table 4.16: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.486 <sup>a</sup>	.236	.211	.879	1.472

a. Predictors: (Constant), Viewpoint Techniques, Scene Construction Techniques, Event Schedules

b. Dependent Variable: Communication of Scientific and Technological Information

The model summary thus established that scene construction techniques, viewpoint techniques and event schedules statistically and significantly predicted communication of science and technological information,  $F(2,61) = 9.431$ ,  $p < 0.05$  (Table 4.17).

**Table 4.17: ANOVA<sup>a</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14.585	2	7.292	9.431	.000 <sup>b</sup>
	Residual	47.165	61	.773		
	Total	61.750	63			

a. Dependent Variable: Communication of Scientific and Technological Information

b. Predictors: (Constant), Viewpoint Techniques, Scene Construction Techniques, Event Schedules

Scene construction techniques and event scheduling techniques had a positive and significant effect on communication of scientific and technological information,  $b=0.315$ ;  $t(61) = 2.997$ ,  $p < 0.05$  (Table 4.18). Similarly, viewpoint techniques had positive and significant effects on communication of scientific and technological information,  $b=0.392$ ,  $t(61) = 3.611$ ,  $p < 0.05$ . Thus the three independent variables, viewpoint techniques, scene construction techniques and event scheduling techniques

together predict the communication of scientific and technological information to non-expert audiences.

**Table 4.18: Coefficients<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	1.286	.679		1.895	.063		
Scene Construction Techniques	.315	.105	.340	2.997	.004	.970	1.030
Viewpoint Techniques	.392	.108	.410	3.611	.001	.970	1.030

a. Dependent Variable: Communication of Scientific and Technological Information

The implication of this model is that besides having positive associations with communication of scientific and technological information, there is also causation between scene construction viewpoint techniques, events scheduling and communication of scientific and technological information.

#### 4.9 Chapter Summary

This chapter has presented, analyzed and discussed both qualitative and quantitative data that was collected based on the variables in the research hypotheses of this study. The independent variables in the hypotheses of this study are: scene construction techniques, event-scheduling techniques and viewpoint techniques. The independent variable is communication of scientific and technological information to non-expert audiences. Quantitative data was analyzed to test the research hypotheses. Qualitative data in form of excerpts of news stories on science and technology was used to supplement the analyzed quantitative data findings. The findings of the study based on both qualitative and quantitative data analyzed have been supported by relevant published literature. The data analysis has established that there is a significant

association between viewpoint techniques and the communication of scientific and technological information to non-expert audiences. Similarly, there is also a significant association between scene construction techniques and the communication of scientific and technological information to non-expert audiences. There were however no significant differences between the event scheduling techniques and the communication of scientific and technological information to non-expert audiences. A summary of these findings, conclusion and their derivative recommendations form the basis of the next chapter.

## CHAPTER FIVE

### SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

#### 5.0 Overview

This chapter provides summary of the study's findings, which have been presented, interpreted, and discussed in chapter four. This chapter draws a conclusion based on the research findings discussed in the previous chapter and makes both research-based and policy-based recommendations. The study sought to investigate journalistic narrative techniques utilized in newspaper news stories to communicate scientific and technological information to non-expert audiences.

The purpose of the study was to examine journalism narrative techniques used in newspaper news stories to communicate scientific and technological information to non-expert audiences. The non-expert audience in this study were defined as the audience without specialist skills on matters science and technology. To be able to communicate to such audiences, journalists use contextualization, narrative hooks, accessibility through enhancing access to scientific and technological information by non-experts, through scientific and technological information validation which makes it easier for the non-expert audiences to access science and technology information; and through non-expert audience engagement with matters science and technology. The study designed both the null and alternate hypotheses. Where the null hypotheses were rejected, the respective alternate hypotheses were adopted without committing type-I error, an error associated with rejecting the null hypothesis when it is true. The study sought to test the following null hypotheses: There is no significant association between the journalists' use of scene constructions in news stories and the

communication scientific and technological information to no-expert audiences; there is no significant relationship between the journalists' use of viewpoint techniques in news stories and the communication of scientific and technological information to no-expert audiences; there are no significant differences between the journalists' events scheduling techniques and non-expert audience's receipt of scientific and technological information. The testing of these hypotheses was set at a significance level of 0.05.

Since narration is studied from a variety of perspectives, there are two main theories within which journalistic narrative techniques and newspaper news writing were examined - the functionalist and constructionist theories; the former focusing on the role narrative techniques play in newspaper news stories in respect to the mass audience and the latter on how news narratives (news stories) are produced (Threadgold, 2005). The key tenets of these theories were used to develop the research hypotheses. The key tenets were: communicating science and technology information through events scheduling, viewpoint techniques and scene construction; that the events and scenes of a news story can be structured in a manner that effectively communicates scientific and technological information with non-expert audiences; that the scientific and technological information in a news story can be rendered from a number of viewpoints such as expert viewpoint, witness viewpoint and narrator viewpoint. The study also relied on the Cognitive Approach by Mark Turner and Jerome Bruner which treats news narratives as text for human thought, or cognition; meaning that news narratives can be subjected to textual analysis from a cognitive perspective. The processing of news narratives by the non-expert audiences was based on the theory of the mind which in we rely on other people's viewpoints, cognition and information perception to breakdown and process complex information.

A total of 64 respondents were earmarked for this study through a census. This number was drawn from the four leading national newspapers, *The Nation*, *The Standard*, *The Star* and *People Daily* based in the North Rift Region covering the seven counties: Nandi, Uasin Gishu, Trans Nzoia, West Pokot, Turkana, Elgeyo-Marakwet and Baringo. This total number of respondents included reporters, photographers and bureau chiefs collectively described in this study as newspaper news journalists. Since the study did not involve studying the effects of narration techniques, the newspaper mass audiences were not included in this study. Both quantitative and qualitative data were collected and analyzed in this study. The qualitative data was grouped into four themes namely: viewpoint techniques, event scheduling techniques, scene construction and science and technology communication. The quantitative data on these themes was collected using the questionnaire where data on these themes was ranked. Quantitative data was collected using a structured questionnaire while the qualitative data comprised of samples of news stories that were published in the four newspapers in the year 2019. The presence of narrative techniques such as scene construction, events schedules and view point techniques, together with aspects of science and technology such as discovery of fossils, scientific and technological innovations, scientific and medical breakthroughs as well as geological features such as geysers were used as a criterion for selection of these stories. The stories were obtained through a purposive search of the websites of these newspaper companies for the year 2019 only. This year was considered the latest by the time the study was being conducted, or when data was being conducted for the study. During data analysis, reference has been made to excerpts of these stories. The study relied on quantitative data to test the research

hypotheses and findings complemented by qualitative data then discussed alongside published literature for purposes of validating the findings.

### **5.1 Summary of Findings**

On demographic characteristics of the respondents earmarked for this study, the descriptive statistical results of the categorical variables representing demographic characteristics revealed the following that level of education among newspaper news journalists appeared to be high. A majority of the journalists (78.1%) were degree holders, while the remaining 21.9% were diploma holders. The distribution of journalists by Newspaper Company was even with 26.6% of the reporters drawn from *The Nation* and *The Standard* respectively; and 23.4% each for journalists coming from both *The Star* and *People Daily*. Most of the journalists (43.8%) had thematic specialization in science and technology. A sizeable proportion (21.9%) was thematically specialized in money and business, while 17.2% each had a specialist in politics, and law and crime respectively. The journalists had the requisite experience. Most of the journalists (46.9%) had an experience of over 5 years, while 32.8% had an experience of 4 years. Cumulatively, 89.1% of the reporters had an experience of more than 2 years.

The study has established that newspaper news journalists drawn from the North Rift region employ a number of elements to construct scenes in their reporting, being mainly guided by the goal of the story, the story's thematic significance, conflict normally rendered through tension and suspense. Dramatic action unfolding through the story and time and place settings through which the events in the story take place. In so doing, they remain consistent with previous studies, which have shown that

newspaper news journalists tend to combine literary and journalistic elements in their news story writing (Pottker, 2014).

The findings on scene construction techniques affirm that newspaper news journalists in the North Rift region utilize a number of scene construction techniques to communicate scientific and technological information to non-expert audiences. These techniques are summarized as use of punctuation marks (82.8%) to vary moods across the scenes of the story; use of transition markers (81.2%) to capture mood through the scenes; use of multiple paths (62.5%) into the story to enable the non-expert audiences understand and follow information through the scenes of the story; switching voices (54.7%) through the scenes of the story a concept which has been described as polyphony; and shifting from description to analysis for purposes of giving more information on content that may require more information to be understood by the non-expert audiences.

Chi Square test of independent samples was used to test the relationship between newspaper news journalists' use of scene construction techniques and their communication of scientific and technological information. The results of the chi-square tests indicated that there was a statistically significant relationship between newspaper news journalists' use of scene construction techniques and their communication of scientific and technological information,  $\chi^2 (1) = 8.195$ ,  $p=0.004$ .

The study sought to test the association between the newspaper news journalists' use of viewpoint techniques and their communication of scientific and technological information. The chi-square tests output revealed that there was a statistically significant association between news reporters use of viewpoint techniques and their communication of scientific and technological information,  $\chi^2 (1) = 6.668$ ,  $p=0.010$ .

Besides, the Phi ( $\phi$ ) measure of strength of association confirmed that the association between use of viewpoint techniques and communication of scientific and technological information was moderately strong,  $\phi = 0.323$ ,  $p = 0.010$ .

Based on non-violation of homogeneity of variance, equal variances were assumed, and the first row was then used for further interpretations. Event scheduling mean score 0.063 (95% CI, -0.309 to 0.434) was higher than of the communication of scientific and technological information. Thus, there was no statistically significant differences in mean scores between event scheduling techniques and communication of scientific and technological information,  $t(126) = 0.333$ ,  $p = 0.739$ .

## 5.2 Conclusion

The study has established that the newspaper news journalists in the study had a minimum of a diploma level of education and a maximum of a university level of education. None had a master's degree by the time the study was being conducted. The journalists thus had requisite training and skills to work as journalists and were registered and recognized by the Media Council of Kenya to practice. Both *The Nation* and *The Standard* had the largest number of journalists assigned to the North Rift Region, while *The Star* and *People Daily* had the least number of journalists. This is attributed to differences in the financial and market share capacities across the four newspaper news companies. Because of these variations, it was difficult to specifically assign journalists to a particular beat of reporting. This explains why the newspaper news journalists were assigned across beats such as science and technology, money and business, politics, law and crime and war and conflict; and across a wide and expansive North Rift Region.

From the quantitative data analyzed and the excerpts analyzed, the aspects of science and technology utilized by newspaper news journalists in the north rift region are the discovery of fossils at Lake Turkana; the scientific mystery about the fading of Lake Bogoria Geysers; the array of inventions and innovations at the 8<sup>th</sup> International Conference on Implementing the Sustainable Development Goals held at the Rift Valley Technical Training Institute, Eldoret; and the scientific and medical breakthroughs in kidney transplant and open-heart surgery at the Moi Teaching and Referral Hospital, Eldoret. This is what constituted the scientific and technological information being communicated to non-expert audiences and consequently the dependent variable for this study.

The scene construction techniques utilized by newspaper news journalists in the North Rift Journalists are use of punctuation marks in the stories so as to capture the mood unfolding through the scenes of the news stories, blending of voices of narration through the scenes of the stories( the voice of the journalist, voice of the witnesses , that of experts and innovators),offering the non-expert audience multiple paths through which to understand scientific and technological information unfolding through the scenes of the news stories, use of transition markers to mark change of time and place settings through the scenes of the news stories and relying more on description and analysis through scenes of the stories to effectively enable non-expert audiences understand the scientific and technological information.

From the newspaper excerpts and quantitative data, the view point techniques used by newspaper news journalists in the North Rift Region are use of pronominal and grammatical references such as *he she, it* so as to locate viewpoint to a particular news source for purposes of authenticity; use of verbs of perception to narrate the

events through the cognitive viewpoints of news sources; use of tense markers to signal change a shift in viewpoint in time and place; and describing events from the viewpoint of characters such as innovators, scientists, experts, and witnesses. The net effect here is for the non-expert audiences to contextualize and understand scientific and technological information from each of this viewpoints or perspectives.

Lastly, the events scheduling techniques utilized by newspaper news journalists are rendition of events through the eye and mind of a character; representation of events through the perspective of news sources; restructuring events in the news story to depict reality and fact; and deviation of the traditional inverted pyramid structure so as to make use of description and analysis in the interest of non-expert audiences' understanding of scientific and technological information. All these journalistic narrative techniques have been found to have a relationship with the communication of scientific and technological information to non-expert audiences based on the hypotheses testing techniques employed in data analysis.

### **5.3 Recommendations**

Based on the findings of the study, the researcher wishes to make a number of research-based and policy- based recommendations:

#### **5.3.1 Research-Based Recommendations**

- 1) During the study, it emerged that journalists raised concerns on the inadequate support and collaboration coming from the science community, and as such, journalists have found a challenge in keeping in touch with the scientists, local science and technology institutions to follow up and monitor science and technology developments to include in their reportage. The study therefore

calls for collaboration between the scientists and journalists in the efforts to track, share and digest scientific and technological information for the benefit of the no-expert audiences

- 2) From the field data and the literature reviewed in this study, it emerged that there is an uneasy relationship between newsrooms and science and technology research institutions and organizations. The two organizations for example hold divergent views on the framing of science and its presentation. While journalists prefer to simplify science and technology for the lay audience, scientists give prominence to scientific accuracy. The study therefore calls for a common and unified approach to science and technology framing and presentation to the benefit of the non-expert audiences
- 3) While selecting news stories on science and technology carried in the Kenya's leading newspaper during the time scope of the study, it emerged that not many stories on science and technology were published during the period in which the study was conducted. The literature review on science journalism seems to corroborate this trend. Where science and technology related topics were published, they were allocated relatively small amount of space and some cases the science and technology stories were used as space-fillers. The study therefore recommends that local media houses delve more into science and technology stories and give more prominence to science and technology stories due to their centrality to economic transformation and development
- 4) Judging from the manner in which the science and technology stories were rendered in newspapers cited in the study, the manner of packaging and presentation of the news stories was limited in terms critical science and

technology news reporting. The limited critical and comprehensive reporting of science and technology issues led the reporters and editors to render the stories as straight news despite the luxury of print space. There is therefore urgent need to train reporters and editors on critical and comprehensive science and technology reporting to enhance and expand the synthesis of such information among the lay audience.

- 5) The study has established that a total of 64 journalists cover the entire of the North Rift Region comprising of seven counties. In some cases, one photojournalist and a reporter are sent out to cover stories across the region and this is cumbersome. The study therefore recommends that the newspaper companies assign or employ more journalists to adequately cover news stories as they break out and in real time.
- 6) It is emerging from the study findings that the journalists in the North Rift Region are assigned to cover stories across beats as opposed to dedicating a journalist to a specific beat for purposes of specialization. To enhance this specialization and for purposes of in-depth and well-researched news reports, there is need for media houses to dedicate specific journalists to specific beats.
- 7) From the analysis of the excerpts of the news stories, the researcher established that some scientific and technological terms were not in simple terms explained for the non-expert audiences. For example, the terms *open heart surgery*, *kidney transplant*, *automatic chain link machine* and *mechanized planter* needed additional information to enable the non-expert audience understand them. For this reason, the Media Council of Kenya needs to organize seminars and workshops on science and technology reporting to

enable journalists handle such information and effectively relay it to the non-expert mass audiences.

- 8) An analysis of the news stories attached to the appendix section of this study reveal that that there is a problem in directly attributing stories to sources. Ideally, in direct quotations, the attribution is normally placed at the end of the first sentence of the quotation and not at the end of the last sentence of the quotation. There is therefore need for the Media Council of Kenya, a body constitutionally empowered to offer continuous training for practicing journalists, organizes seminars and workshops on attribution in news stories especially in direct quotations of the news sources.
- 9) While clarifying the scene construction techniques to the respondents as they completed the structured questionnaire, it emerged that most of the journalists were not aware of the use of literary techniques in news writing especially with the reversal of the traditional inverted pyramid style. This means that literary journalism/narrative journalism has not been popularized among practicing journalists yet it was evident in the stories some of the journalists filed. It is therefore imperative for media houses to organize in-house training of their journalists on the use of literary techniques in news story writing.

### **5.3.2 Policy-Based Recommendations**

- 1) The Kenyan government recognizes the centrality of Science, Technology and Innovation (ST&I) in wealth creation and building human capital required for the transition to a knowledge driven economy. Besides, vision 2030 proposes to intensify the application of ST&I to raise productivity and efficiency levels

across the four pillars of national development—food security, affordable housing, manufacturing and affordable healthcare. As a result, the Government is implementing the ST&I policy framework through the identification, acquisition, transfer, diffusion and application of relevant ST&I information in all sectors of the economy. The government therefore needs to support the capacity building of all institutions, the media included, involved in generation and diffusion of information related to ST&I for sustainable development. In particular, journalists who specialize in generating and dissemination of ST&I information in form of news stories need to be trained through grants from the ST&I and Vision 2030 sectors. This will ultimately support the government's efforts towards raising productivity and efficiency the key pillars towards realization of vision 2030

- 2) The Science Technology and Innovation (ST&I ) Act 2013 established the National Council for Science, Technology and Innovation, a semi-autonomous Government agency to promote increased awareness, knowledge and information of research system, sponsor national scientific and academic conferences in consultation with the National Research Fund Trustees, Promote the adoption and application of scientific and technological knowledge and information through public education towards attaining national development goals. To this end, the study recommends that NACOSTI works closely with the media, and in particular, journalists that specialize in science and technology reporting to enhance its mandate and efforts towards the adoption and application of scientific and technological knowledge and information towards the realization of the national development goals. The media, through the science and technology reporters,

can highlight and publicize the scientific and technological innovations for sustainable development.

- 3) The study further recommends that The Media Council of Kenya to include literary or narrative journalism among its short-term courses that are aimed at promoting good standards of media practice and community access to information. Currently the courses offered are: Introduction to journalism ethics; Safety and protection of journalists; Access to information; Climate Change Reporting, Health Reporting, Conflict reporting and peace journalism. By including Literary/Narrative/ New Journalism practicing journalists will be better equipped on how to utilize narrative techniques in particular beats such as crime, science and technology, murder, accidents, health just to name a few

#### **5.4 Suggestions for Further Study**

The current study by design and focus did not involve the study of the effect of journalistic narrative techniques in news stories on audience engagement and processing of information. The researcher thus suggests that future studies be done focusing on these aspects for purposes of widening the scope of knowledge in narrative journalisms.

Lastly, similar research needs to be done in the same area, but focus on the news stories on the broadcast media to compare the utilization of journalistic narrative techniques in news stories on the broadcast media with those in newspapers.

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## APPENDIX I: LETTER OF INTRODUCTION

### To Whom It May Concern

Dear Participant,

My name is MAMBOLEO GIDEON, a PhD student at Moi University, Eldoret, School of Information Sciences. I am undertaking a research study on: *Journalistic Narrative Techniques Employed by Newspaper Journalists in News Stories to Communicate Scientific and Technological Information to Non-Expert Audiences.*

The significance of the study is to analyze narrative techniques employed by newspaper journalists in news stories to communicate scientific and technological information to their audiences who may not be experts on matters science and technology. The outcome of this study is expected to contribute to policy issues that can help address challenges associated with the use of narrative techniques to communicate science and technology to audiences that lack expert knowledge on this subject.

It is hoped that this study will provide insights into narrative journalism as a new phenomenon and, more so, how the narrative journalism techniques can be utilized to communicate science and technology in news stories. Consequently, you have been chosen to participate in this research. Kindly, I request a little of your time to respond to each of the items on the questionnaire attached. This research is purely for academic purposes.

Please respond to all items on the questionnaire by appropriately ticking in the box/cell against each item.

**SECTION- I****DEMOGRAPHIC INFORMATION**

1. Indicate your level of education by ticking in the appropriate box:

Diploma

Higher Diploma

Degree

Masters

PhD

2. Indicate the newspaper you report for:

The Nation

The Standard

The Star

People Daily

3. Indicate the beat within which you report:

Science and Technology

Money and Business

Politics

Law and Crime

War and Conflict

4. For how long have you worked for the media organization?

1 Year  2 years  3 years  4 years  over 4 years

## SECTION- II

### INFORMATION ON RESEARCH VARIABLES

**KEY:** *SA-Strongly Agree (Rank 5); A-agree (Rank 4); N-Neither Agree nor Disagree (Rank3); D-Disagree (Rank 2); SD-Strongly Disagree (Rank 1)*

#### A) Viewpoint Techniques and Communication of Scientific and Technological Information to your audience

1.) As a newspaper reporter I utilize the following types of viewpoint to communicate scientific and technological information to your audiences:

No	Viewpoint type	Rank				
		S. A	A	N	D	SD
1	Spatial viewpoint- relating to space and time in which a news story is told.					
2	Psychological viewpoint- relating to the mind of the people telling the story e.g. witnesses, experts etc.					
3	Phraseological viewpoint-using phrasal verbs, adjectives, adverbs etc to describe events in a story.					

2.) As a newspaper reporter I utilize the following viewpoint techniques to communicate science and technology information to your audience:

No.	Viewpoint Technique	Rank				
		S. A	A	N	D	SD
1	Use of pronominal references e.g. “he/she”, it” to locate viewpoint to a source					
2	Use of grammatical subjects e.g. ‘it’ to relate events through viewpoints of news sources					
3	Using verbs of perception e.g. see, feel, imagine, sense etc. to tell events through viewpoints of sources					
4	Use of tense markers e.g. past, present and future to signal change of viewpoint in time and place					
5	Describing events through the viewpoint of a character to dramatize events in a story.					

## B.) Scene Construction Techniques and Communication of Science and Technology to your audience

1.) As a newspaper reporter, I utilize the following elements of scene construction in your news stories:

No.	Element of scene construction	Rank				
		S. A	A	N	D	SD
1	Time and place in respect to events and people					
2	Dramatic action e.g. action that unfolds through scenes in a story					
3	Conflict that is rendered through tension and suspense					
4	Thematic significance e.g. the moral or lesson from the story					
5	Goal i.e. how scenes achieve the goal of the story					

2.) As a newspaper reporter, I utilize the following techniques of scene construction in my stories to communicate with my audience:

No.	Scene Construction Technique	Rank				
		S. A	A	N	D	SD
1	Using transition markers to indicate change of scenes in time and place in a story					
2	Offering multiple paths into a new story through scenes					
3	Switching voices through scenes to develop the story					
4	Use of punctuation marks to create mood through scenes					
5	Shifting from description to analysis through the scenes of the story.					

**C) Event Scheduling and communication of scientific and technological information to non-expert audiences**

As a newspaper reporter, I utilize the following event structuring /scheduling to communicate Science and Technology information to my audience:

No.	Event Schedule	Rank				
		S.A	A	N	D	SD
1	Reversal of the traditional pyramid structure					
2	Shifting verb tenses to signal change of events in time and place					
3	Events representation from the perspective of the people involved					
4	Events are rendered through the eye and mind of a character					
5	Depiction of reality through event structuring					

**D) Aspects of Science and Technology information communicated to non-expert audiences in Newspaper news stories**

My newspaper news stories/reports cover the following aspects of science and technology:

No.	Aspect of Science and Technology	Rank				
		S.A	A	N	D	SD
1	Discovery of animal fossils on shores of lakes and other sites					
2	Scientific innovations e.g. wind power projects, and many more					
3	Scientific inventions e.g. making biscuits from termites by Rift Valley Technical Training Institute students					
4	Agricultural technological innovations e.g. mechanized planters by Rift Valley Technical Training Institute students					
5	Geological and volcanic features e.g. water geysers of Lake Bogoria					
6	Scientific medical breakthroughs e.g. Separation of conjoined twins at MTRH					

Thanks a lot for taking your time to respond to each of the items in this questionnaire.

## APPENDIX II: EXCERPTS OF NEWS STORIES

### APPENDIX TWO: EXCERPTS OF NEWS STORIES

#### EXCERPT ONE

Turkana: A paradise for fossil excavators

TUESDAY AUGUST 13 2019



The site where the fossil of Turkana Boy was discovered at Nariokotome approximately 200km North of Lodwar town, Turkana County. PHOTO | COURTESY

#### Summary

- When archaeologists and paleontologists descend on Lake Turkana basin, they are usually an excited lot as they may stumble on an item, tool or skeleton that could help them find the missing link in the story of the evolution of man and other species.
- The basin is rich in fossils and scientists regard it as a reservoir of vital information that can make the world understand its past.
- The basin, which includes the world's largest desert lake and parts of the Omo Delta in southern Ethiopia, has provided evidence of evolution, the advance of technology from stone tools to the Iron Age and the domestication of animals.

**By ABYSSINIA LATI**

More by this Author

Fossil KNM-WT 15000 is famous the world over.

It is kept under lock and key at the national museum since it is the most complete skeleton of a walking early man — dating between 1.5 million and 1.6 million years.

KNM-WT stands for Kenya National Museum, West Turkana.

At the location it was found in Nariokotome, a stone pillar was erected a few years ago.

KNM-WT 15000 is a significant find that helped the world understand the evolution of human beings.

Also known as the Turkana Boy, the skeleton was found in 1984 by Kamoya Kimeu, a celebrated fossil hunter.

### **TURKANA BOY**

“Turkana Boy was *Homo erectus* — the species that was the first human ancestor and a top predator. He was able to compete with the big cats for meat,” Prof Isaiah Nengo, the director, Research and Science at the Turkana Basin Institute (TBI), said.

“They invented and used sophisticated tools like the hand axe and we strongly believe they were the first human species to use fire.”

Being a hunter, *Homo erectus* was bigger than his predecessors whose diet was mainly vegetables and whose maximum height was below 4.5ft.

Scientists say Turkana Boy died aged 12 when he was 5.5ft tall.

Had he lived to adulthood, Turkana Boy might have grown to 6ft or more.

According to the fossil evidence, *Homo erectus* was the first “human” to migrate from Africa to Asia and Europe more than a million years ago.

To celebrate this remarkable find, a monument with a replica of the skeleton was erected close to the excavation site in Turkana North Sub-County, approximately 200 kilometres north of Lodwar, the county headquarters.

### **EVOLUTION STORY**

This was done by the Turkana devolved government, the TBI and the National Museums of Kenya in 2015.

A year before that, another exciting find was unearthed in Napudet, about 20 kilometres east of Lodwar.

It provides evidence of humans and apes originating from Africa.

Before that, it had long been argued by many in the scientific community that the origin of the ape family was Eurasia.

Appropriately named Alesi — which comes from the Turkana word for ancestor “ales”, the 13 million-year-old discovery is the world’s most complete skull.

It was found by Mr. John Ekusi during an expedition led by Prof Nengo. Thus, on two separate occasions, Turkana has contributed significantly to the study of palaeoanthropology.

When archaeologists and palaeontologists descend on Lake Turkana basin, they are usually an excited lot as they may stumble on an item, tool or skeleton that could help them find the missing link in the story of the evolution of man and other species.

### **DESERT LAKE**

The basin is rich in fossils and scientists regard it as a reservoir of vital information that can make the world understand its past.

The basin, which includes the world's largest desert lake and parts of the Omo Delta in southern Ethiopia, has provided evidence of evolution, the advance of technology from stone tools to the Iron Age and the domestication of animals.

"In the search for human evolution evidence, Tanzania, Ethiopia, South Africa and Kenya lead. However, Kenya is unique as it provides the proof of Africa being the origin of human beings and apes," Prof Nengo said.

TBI, founded in 2007 by renowned Kenyan palaeoanthropologist Richard Leakey, has two centres: Turkwel in Turkana County and Ileret in Marsabit.

At any given time, paleontologist's teams can be found at excavation sites in Turkana County.

Apart from human evolution, they also want to understand the environment of the early man by studying plant and animal remains.

## EXCERPT TWO

### Mystery rocks Lake Bogoria as geysers fade

By CAROLINE CHEBET | February 5th 2019 at 12:15:00 GMT +0300



*The state of the geysers in 2019. Two years ago, they could go as high as 30 meters. (Photo by Kipsang Joseph, Standard)*

Richard Yegon takes slow steps, his jacket hung on his shoulder, as he glances at a swollen Lake Bogoria.

His sight is still good, even under the striking sun rays, despite his age. Using his walking stick, he points at a lone bird perched on a tree sticking out of the water, almost 500 metres away.

“There! Over there by the Stone of Sandai, there used to be a geyser jetting over 30 metres high, but it has since been swallowed by the swelling lake. The lake has been swelling and swallowing the geysers,” Yegon, 72, says.

Wikipedia describes a geyser as a “spring characterized by intermittent discharge of water ejected turbulently and accompanied by steam”. As a fairly rare phenomenon, says Wikipedia, formation of geysers is due to particular hydrogeological conditions that exist only in a few places on earth.

Yegon, an Endorois elder, was born and bred in Baringo County. Over the years, he has documented every development in the lake, with almost every spot having a landmark or name the community coined to help in giving directions.

“I have boiled maize and eggs using the geysers and licked the salt residue on the stones to cure stomach aches. I have also been bringing my cattle here to lick salt,” Yegon said. Amidst the memories tied to almost every aspect of the expansive lake, also lies nostalgia of the once glamorous geysers jetting water so high “that we dared not to go nearby”.

Yegon laments that the swelling lake has slowly swallowed the hot springs.

### **Springs jetting**

"There were uncountable geysers and hot springs jetting water with so much pressure. It was magnificent. We used to sit at a distance as we let the steam bathe us," Mr Yegon says.

The increasing water volumes, he says, remain a mystery too.

"It cannot be rain because the lake has never been this swollen, even during the Elnino rains that have pounded this area leading to formation of Lake Kamnarok and Lake 94. It is a mystery, although our fathers believed once in every hundred years, the lake would swell," he says.

The heaviest rainfall Yegon ever witnessed was between 1960 and 1963 and in 1994, which led to formation of Lake 94.

Johana Karatu, 67, has also lived around the lake since he was born.

"There were so many hot springs and geysers here then, but the pressure started slowing when geothermal explorations started in Baringo and Nakuru counties. Every year, things have been changing here with the geysers reducing almost to mere bubbles," Mr Karatu says.

Since 2011, he says, water volumes in the lakes have also increased. Karatu says local communities still hope the water volumes will reduce so the geysers can erupt one more time.

"We do not know when the water will subside, but we hope the geysers will once again erupt. However, we suspect geothermal activities have had an impact on the swelling of the lake and diminishing geysers," Karatu says.

Currently, the springs have been reduced to bubbles. Some of the residents have called for research to explain the change.

### **Geothermal exploration**

"Geologists and researchers should tell us what is happening. We also want to know the impact of geothermal exploration on geysers," Karatu says.

Lake Bogoria National Reserve warden James Kimaru says geysers have been reducing over time.

"The water volume in the lake has been increasing, covering some of the geysers," says Mr Kimaru.

Florence Tanui, a geologist, says geysers are rare due to a combination of hydrogeological factors, including water, heat and unexpected plumbing beneath the surface of the earth.

"This phenomenon only exists in very few areas on earth, including our own Lake Bogoria. The heat needed for geysers to form originates from the magma chambers close to 2,000 meters deep," says Ms Tanui.

Lake Bogoria, she says, is widely known for the high-energy geysers on its western shores. The area is covered by volcanic rocks with a shallow magma chamber allowing formation of geysers.

She, however, says eruptive activity of geysers may change over time as a result of fissures, earthquakes and human activity such as geothermal power plants.

“Geysers can become extinct or dormant due to installation of geothermal power stations within their vicinity. This is because drilling at the geothermal sites for steam extraction robs the geysers the water and the heat needed to sustain the pressure and may potentially lower the local water table to the point that geysers activity become unstable,” she adds. When that happens, she says, geysers stop erupting and occur as bubbles before becoming extinct.

“The steam extraction leads to slow cooling of the magma environment eventually leading to dormancy or extinction of once eruptive geysers.”

Some of the world’s geysers, Ms Tanui says, have been extinguished by geothermal energy development and tourism activities.

“The Wairakei geyser in New Zealand that hosted the world’s second-largest geothermal power plant in 1958 became extinct following the site activity. The Nevada-Beowawe in north eastern Nevada in the United States also became extinct due to several geothermal power stations that were set up across the area,” she says.

She says geysers require close attention to establish possible impacts of geothermal activities as well as other human activities.

### **Water quality**

Joseph Edebe, a researcher from Kenya Wildlife Service, says the rising water levels in Lake Bogoria may also influence the water quality, reducing the food base for flamingos.

“Lake Bogoria is a wetland of international importance as a Ramsar site and World Heritage Site. The rise in water levels may influence the water quality, hence reduce the food base of lesser flamingos that depend on spirulina, an algae that grows in alkaline conditions,” says Mr Edebe.

The decline of food base, he says, may also result in the decline in flamingo numbers as well as change in the ecological characteristics of the lake.

He says KWS researchers are partnering with other stakeholders in monitoring water levels and quality in the affected lakes.

“An integrated management plan for the Lake Bogoria ecosystem is also being prepared by the local community, the county government of Baringo with technical support from KWS, a plan that will enhance the conservation of the lake,” says Edebe.

## EXCERPT FIVE

**Dazzling array of inventions premier at technical fete**  
 By FRED KIBOR | June 21st 2019 at 12:00:00 GMT +0300



*Collins Kemboi (in overall) and Kopher Namu (in red t-shirt) work on their innovation dubbed 'The Engine Propelled Planter' during the 8th Rift Valley Technical Training Institute 8th International Conference in Eldoret. [Kevin Tunoi/Standard]*

The 8th Rift Valley Technical Training Institute (RVTTI) International Conference lived up to its billing as a meeting of innovative minds.

During the three-day forum that started yesterday, youths from the various Technical and Vocational Education and Training (TVET) institutions across the region showcased their inventions aimed at solving contemporary technical challenges.

The innovations aptly represented the conference's theme 'Implementing the Sustainable Development Goals for green economies and societies, or the TVET Agenda.

On display were various inventions, including improvised planting machines, semi-automatic chain-link machines and kitchen gardens.

All the inventions on exhibition were modeled to mitigate the effects of global warming. Kenneth Njoroge and John Benson Mathenge, both automotive engineering students at Nyandarua Institute of Science and Technology, presented a semi-automatic chain link machine used to make fencing materials that took them two years to invent.

"At the moment there is global warming going on and people mainly depend on trees to fence. But now that trees are disappearing, there is need to conserve the remaining ones. But people have to fence their homes and properties and we thought of how to fence permanently without cutting down trees, thus the chain-link machine that interlaces wires into a fencing material," said Njoroge.

He said that the invention, which was first operated manually before it was automated, has helped many homes prefer chain-link fencing that does not use wooden poles.

“We joined the institute in 2016 and conceptualized our idea which unfolded after several false starts due to lack of finances to buy materials,” said Njoroge.

“We make and sell the machines to companies that manufacture chain-links and apart from saving trees, the machines are efficient and environmentally friendly,” he said.

#### **Planting machine**

Collins Kemboi and Kepher Namu from RVTTI presented an automated planting machine for small-scale maize, beans and sorghum farmers.

“Majority of small scale farmers use oxen ploughs while planting cereals which is cumbersome, inefficient and time consuming. Our invention allows a farmer to drive the planter and sow his farm in record time,” said Kemboi.

Assembled from scrap metals, Kemboi said the machine saves farmers time and resources.

“Technology is the way to go in solving some of the challenges affecting the globe. What is needed is adequate funding to allow inventors to actualize their ideas,” he said.

His fellow inventor, Namu, called on the youth to embrace technology and use it to create jobs.

“It is only through innovation that the youth can make a decent living,” he said.

The RVTTI Principal Edwin Tarno said ideas generated during the conference are modeled to solve some of the world’s technological challenges.

“We have partnered in research and technology with global institutions such as International Centre for Technical and Vocational Education (UNEVOC) and International Development Research Centre (IDRC) to implement the inventions in our TVETs,” said Dr Tarno.

UNEVOC representative Wilson Limer said the centre was committed to assisting member States in transforming TVETs.

“The TVET sector is the engine that drives the world’s agenda,” he said.

**EXCERPT FOUR****MTRH upgrades to offer kidney transplants and Open- heartsurgeries**

This is in line with the government's Universal Health Care programme

In Summary

- The number of ICU units has grown from six to 20 and the High Dependency Unit modernised to handle emergency cases
- More than 1,200 outpatients are attended to on a daily basis.

Moi Teaching and Referral Hospital CEO Wilson Aruasa in Eldoret on March 3



Image: BY MATHEWS NDANYI

Moi Teaching and Referral Hospital CEO Wilson Aruasa in Eldoret on March 3, 2019.

**WAY FORWARD**

Moi Teaching and Referral Hospital has upgraded its health services to include specialized surgeries, kidney transplants and open-heart surgeries.

Last week, the Eldoret-based hospital carried out 20 plastic surgeries on burns' victims, according to chief executive officer Wilson Aruasa. One kidney transplant would be performed weekly.

The hospital has also upgraded and expanded its High Dependency and ICU units to be able to handle emergency cases.

The number of ICU units has increased from six to 20.

The upgrade is in line with the government's Universal Health Care programme, Dr Aruasa said on Friday.

He said they were intensifying outreach services in counties during which their health personnel will be trained to enable Kenyans to access specialised health services.

The CEO said the upgrade would translate into fewer Kenyans seeking treatment outside the country.

“We are fully committed to supporting President Kenyatta’s Big Four Agenda especially on healthcare by closely collaborating with the Ministry of Health and other stakeholders.”

The hospital treats more than 1,200 patients in the outpatient and emergency units daily. On average, it admits 1,300 patients every day.

Dr Aruasa said consultations with regional counties were ongoing with the intention to reduce the number of cases referred to the hospital.

MTRH has an outreach of 22 counties. It also receives patients from neighbouring countries.

The hospital is involved in an extensive campaign to ensure that many Kenyans enroll with the National Hospital Insurance Fund.

The health facility is owed more than Sh500 million by patients who cannot afford to pay for treatment. It occasionally waives charges for poor patients.

MTRH is the second largest referral hospital in the country after Kenyatta National Hospital.

### APPENDIX III: CONTENT ANALYSIS SCHEDULE

<b>Step 1: Qualitative Data Familiarization</b>	
<b>Familiarization of qualitative data in the excerpts of the news stories:</b>	
1) <i>News narrative viewpoints</i> : expert viewpoint, witness viewpoint and narrative viewpoint	
2) <i>Scene construction</i> : transition markers, multiple perspectives, switching of voices, use of punctuation	
3) <i>Events scheduling</i> : News narrative format, verb tenses, event perspectives, rendition of events, reality through events	
<b>Step 2: Coding</b>	<b>Codes</b>
<b>Narrative Theory Assumptions</b>	
Communication of TechScience through Viewpoint	1) Expert 2) Witness 3) Narrative
Communication of Tech Science through scenes	1) Markers 2) Perspectives 3) Voices 4) Punctuation
Communication of Tech Science through event schedules	1) Format 2) Tenses 3) Perspectives 4) Rendition 5) Reality
<b>Step 3: Generating theme</b>	
<b>Turning codes into themes</b>	
<b>Codes</b>	<b>Theme</b>
<ul style="list-style-type: none"> <li>• Expert</li> <li>• Witness</li> <li>• Narrative</li> </ul>	View point Techniques
<ul style="list-style-type: none"> <li>• Markers</li> <li>• Perspectives</li> </ul>	Scene Construction

<b>Step 3: Generating theme</b>	
<b>Turning codes into themes</b>	
<b>Codes</b>	<b>Theme</b>
<ul style="list-style-type: none"> <li>• Voices</li> <li>• Punctuation</li> </ul>	
<ul style="list-style-type: none"> <li>• Format</li> <li>• Tenses</li> <li>• Perspectives</li> <li>• voices</li> <li>• Punctuation</li> </ul>	Events Scheduling
<b>Step 4: Reviewing themes</b>	<b>Criteria for Review</b>
<b>Theme</b>	
Viewpoint techniques	Presence of experts in the story Presence of witnesses to events Reporters vice/narration
Scene Construction	Use of transition Markers Use of multiple story perspectives Use of multiple narration Voices Use of punctuation
Events Scheduling	Use of pyramid style Use of tenses to mark time changes Use of multiple narration voices Use of multiple perspectives
<b>Step 5: Defining and Naming themes</b>	
Viewpoint techniques:	Communicating TechScience to non-expert audiences through various perspectives
Scene Construction:	Communicating TechScience to non-expert audiences through news scenes or settings
Events Scheduling:	Careful and thoughtful structuring of events in the news story to engage non-expert audiences on matters TechScience

<b>Step 6: Presenting Findings</b>
i. Restating the research hypotheses
ii. Grouping qualitative data into the themes based on the tenets from the structural and functional approach
iii. Using a deductive approach to analyze the qualitative data
iv. Each theme was developed into a research hypothesis such that the qualitative data findings converged with quantitative data at the level of data analysis.
v. Any gaps related to patterns and trends for example inconsistency, assigning of meaning and contextualizing the findings are filled
vi. Drawing conclusions from the findings of qualitative and quantitative data analysis.

