Aspects of the Interactive Approach that Affect Learners' Achievement in Reading Comprehension in Vihiga County, Kenya: A Focus on Background Knowledge

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ABSTRACT

Learners' background knowledge is an aspect of the interactive approach instruction, which facilitates reading of comprehension passages. In Vihiga County, learners' performance in English language examinations is not only lower than that of neighbouring counties, but also poorer in the comprehension reading sections. Few studies have examined the connection between learners' background knowledge and achievement in reading comprehension in Vihiga County. This study aimed at determining the effect of learners' background knowledge on their achievement in reading comprehension in the said County. A quasi-experimental design was adopted and primary data sourced from 279 learners and 8 teachers. Multiple linear regression analysis generated a model for the experimental group (Model 1) and another one for the control group (Model 2). In both models, learners' background knowledge caused a positive effect on the achievement in reading comprehension (Model 1: Beta = 0.412, t = 1.965, p = 0.041; Model 2: Beta = 0.413, t = 1.902, p = 0.059). In both models, the effect was significant, at 95% and 90% confidence levels, respectively; thus, leading to rejection of the null hypothesis for being untrue. Nonetheless, the effect was stronger in the experimental than in the control group, which led to the conclusion that training teachers of English language on how to correctly apply the interactive approach instruction is likely to improve their effectiveness in activating learners' background knowledge, for better achievement in reading comprehension. The study amplifies the need for: continuous training, instructional resources, innovation and use of alternative resources.

Keywords: *Interactive approach, Instruction, Achievement, Reading skills, English language, Comprehension, Background, Knowledge.*

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Highlights of this paper

- This study aimed at determining the effect of learners' background knowledge on their achievement in reading comprehension in the said County.
- Few studies have examined the connection between learners' background knowledge and achievement in reading comprehension in Vihiga County.
- The study amplifies the need for: continuous training, instructional resources, innovation and use of alternative resources.

1. INTRODUCTION

English language occupies a central position in curriculum delivery at all tiers of the Kenyan education system. At the primary level, for instance, English is the first language of instruction and examination, which places it at the centre of learners' performance, not only in the language itself, but also in other non-lingual subjects (Cox, 2009; Vries, 2011; Finney, 2013). The ability of learners to evaluate and interpret the content of examination questions, as well as provide accurate answers depends on how well their reading and comprehension skills have been developed. Even though verbal instruction is crucial for learners' mastery of the English language, the instructional methods applied by teachers play a greater role in motivating learners to read, as well as deepen and broaden their comprehension skills.

One such method is the interactive approach instruction, which many authors perceive to be effective in activating learners' comprehension reading skills and constructing the meaning of written language or symbols (Hudson, 2007; Amartha, 2013; Nur and Ahmad, 2017). More explicitly, the interactive approach is believed to be effective in improving learners' reading skills, including the ability to relate texts to background knowledge, generate questions on the subject of texts, summarise and predict the meaning of texts, as well as recognise and decode the meaning of words. In this regard, the method enables learners to actively interact with comprehension passages in order to extract the meaning of written language (Harmer, 1983; Amartha, 2013).

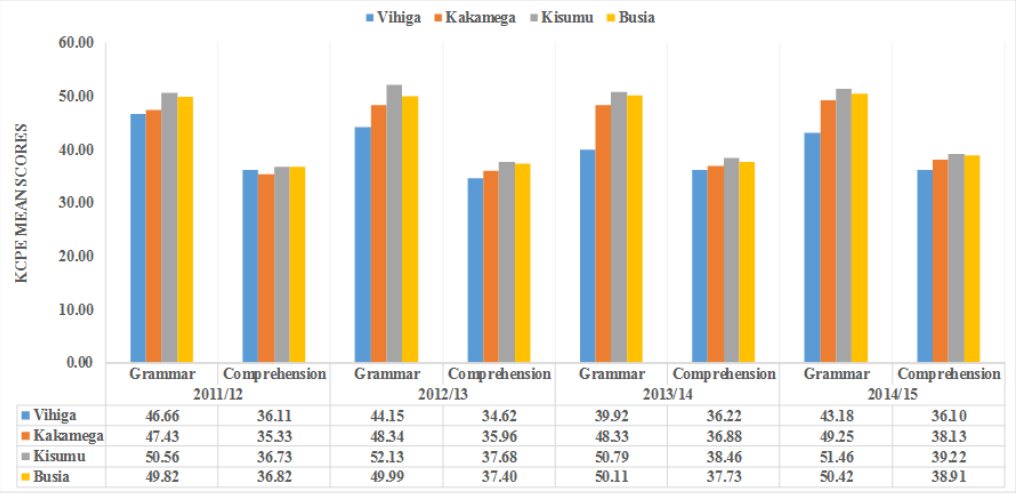
Background knowledge is one of the skills or aspects encapsulated by the interactive approach and one that is indispensable for learners' achievement in reading comprehension. Yuko (2009) observes that the learning process is accelerated when learners are able to connect new information contained in comprehension passages with their prior knowledge relating to the subject of reading. In this regard, an effective instructional method is one that can enable learners to connect the content of comprehension passages with the stock of knowledge they have about the subject in question. As noted by Edwards (2009) learners who can bridge new information to what they already know are better placed to decode and comprehend messages contained in comprehension passages, regardless of inherent vocabularies.

The nexus between the interactive approach instruction and learners' achievement in reading comprehension is a subject that has charmed researchers across the globe, albeit with some bias in favour of developed countries. The analysis of such studies reveal that whereas most of them have investigated effect of the interactive approach instruction on learners' academic performance (Cox, 2009; McCormack, 2010; Vries, 2011; Finney, 2013; Nur and Ahmad, 2017); some have gone to the depth of examining the relationship between individual aspects of the interactive approach, including background knowledge, and learners' achievement in reading comprehension (Ngwaru and Opoku-Amankwa, 2010; Priebe *et al*., 2011; Alfaki, 2013; Warner and Dupuy, 2018).

In Kenya, a number of studies have focused on academic performance of primary school learners in relation to various underlying factors at the institutional, sub-county, county and national levels (Commeyras and Inyega, 2007; Isutsa, 2011; Uwezo, 2012; Kathuri, 2014; Ongatoh, 2017). For instance, Ongatoh (2017) and Isutsa (2011) identify poor instructional methods, as one of the factors contributing to learners' poor performance in national examinations. The only study whose theme is closest to the subject of this study is the one conducted by

Commeyras and Inyega (2007) which investigated the extent to which Kenyan primary school teachers applied the interactive approach instruction to teach reading. Even though the study reported that one-third of the teachers applied the interactive approach when teaching reading, it also established that the procedures applied by teachers were incorrect in 90% of the lessons that were observed. Consequently, it deduced that incorrect application of the interactive approach instruction is one of the factors that contributed to poor performance in English language examinations, which according to Uwezo (2012) remains a pervasive and perpetual challenge in the Kenyan basic education system.

The magnitude of the challenge is amplified in a recent national study, which found that only one-third (32%) of standard six pupils could read a standard-two-level passage in English. Again, the use of ineffective instructional methods was identified as the key factor contributing to learners' poor performance in reading comprehension (Uwezo, 2012). Vihiga is one of the counties in which poor performance in English language examinations has engrossed the attention of stakeholders, including researchers. In this regard, the Kenya National Examination Council (KNEC) annual reports show that the County's performance in the Kenya Certificate of Primary Education (KCPE) has persistently remained lower compared to that of its neighbours such as Kisumu, Kakamega and Busia, as illustrated by Figure 1.



	Grammar 2011/12	Comprehension 2011/12	Grammar 2012/13	Comprehension 2012/13	Grammar 2013/14	Comprehension 2013/14	Grammar 2014/15	Comprehension 2014/15
Vihiga	46.66	36.11	44.15	34.62	39.92	36.22	43.18	36.10
Kakamega	47.43	35.33	48.34	35.96	48.33	36.88	49.25	38.13
Kisumu	50.56	36.73	52.13	37.68	50.79	38.46	51.46	39.22
Busia	49.82	36.82	49.99	37.40	50.11	37.73	50.42	38.91

Figure-1. Learners' performance in the KCPE English language (2011-2014).
Source: Kenya national examination council annual reports.

More irksomely, the KNEC reports reveal that performance has consistently remained relatively lower in the comprehension section than in the grammar section of the English paper (Kenya National Examinations Council (KNEC), 2014). There is no doubt that the variations observed in Vihiga County, deserves a concerted attention of stakeholders, including education practitioners, policy makers and researchers. Despite the gravity of the challenge, none of the Kenyan studies has explicitly examined the causal relationship between learners' background knowledge and achievement in reading comprehension; thereby, exacerbating the dearth of information that would inform appropriate policy, support and facilitative interventions, without which teachers cannot be expected to correctly and consistently activate learners' background knowledge in order to optimise achievement in reading comprehension.

This study was designed to determine effect of background knowledge, as an intrinsic aspect of the interactive approach instruction, on standard six learners' achievement in reading comprehension in Vihiga County. In so doing, the study focused on establishing the truth value of the null hypothesis stating that *background knowledge has no significant effect on learners' achievement in reading comprehension.* Its purpose was to generate information that

would support policy and programming processes aimed at improving access to continuous professional development for English language teachers, provision of appropriate instructional resources, as well as induce further academic investigations in Kenya and other developing countries.

2. LITERATURE REVIEW

The interactive approach instruction traces its roots to the evolution of reading theories, from the bottom-up approach to the top-down approach (Yan, 2002; Hudson, 2007; Sharpe, 2014). It emerges as an integrative model that harnesses the comparative advantages of its predecessors, namely, the bottom-up approach and top-down approach, to facilitate the reading process, by activating readers' knowledge, as well as encouraging readers to interact with texts and authors in the process of extracting the meaning of written language or symbols (Yan, 2002). The interactive approach instruction also facilitates the reading process by stimulating constant interaction between bottom-up comprehension processing skills, such as word recognition and background knowledge; and top-down skills, including prediction, self-generated questions and summarisation (Grabe, 1988; Yan, 2002). It assumes that the two sets of comprehension processing skills contribute uniquely, while influencing each other to effectively support the reading process. Hence, by fusing the bottom-up and top-down comprehension processing skills, the interactive approach instruction enhances readers' ability to understand the written content, which Sharpe (2014) describes as the ultimate goal of reading.

Background knowledge is a top-down instructional strategy which is at the heart of understanding text passages. According to Yuko (2009) background knowledge involves putting to remembrance what one knows. Supporting this assertion, Edwards (2009) opined that without background knowledge, a text becomes not only difficult to interpret but also completely meaningless because background knowledge provides an orienting frame of reference. Therefore, in the view of Robbins (2010) readers bring what they already know on a topic and their experience to a text passage which eventually enhances comprehension because they can make connections between the text, their lives and the world at large.

Thus, when reading, teachers should guide learners on how to bridge the known and the unknown in order to understand the subject of text passages. That understanding is the hallmark of achievement in reading comprehension (O'Connor and Snow, 2013). Extant literature reveals a number of strategies that teachers apply to activate learners' background knowledge in the reading process, including carousal brainstorming, pre-teaching vocabulary, analogy, as well as the Know-Want-Learn (K-W-L) (O'Connor and Snow, 2013).

Carousel brainstorming is a cooperative learning strategy that enables learners to discover and discuss background knowledge prior to studying a new topic. The strategy entails writing on charts key statements relating to the subject of text passages. The charts are then placed at different stations within classrooms to be read, discussed and interpreted by learners, who are organised into small groups of 5 to 6 members. The purpose of such charts is to stimulate learners' thought, imagination and reflection about upcoming reading lessons, as well as help them connect prior knowledge with new understanding (O'Connor and Snow, 2013; Dubé *et al.*, 2014).

Pre-teaching vocabulary is an essential strategy for activating learners' background knowledge by enabling them to understand the meaning of new and/or difficult words used in text passages. The strategy entails guiding learners in exploring the meaning of such words prior to encountering the same when reading passages. The strategy is known to activate and increase background knowledge, as well as aid learners to connect text passages and their cumulative knowledge about the subject at hand (Sadoski and Willson, 2006; Jenkins *et al.*, 2013; National Reading Panel, 2014).

K-W-L is a top-down pre-reading instructional strategy through which learners are guided through a text. Learners begin by brainstorming everything they know about a topic and record it in the K column of K-W-L chart. Learners then generate as many questions as possible on what they want to Know about the topic and list them in the W column of the K-W-L chart. After reading the comprehension text, learners go back to column W and answer the very questions they generated. The answers to the questions become the new information that they have learned and are recorded in the L column of the K-W-L chart. According to Setiawan *et al.* (2014) the K-W-L strategy ensures learners are actively involved in eliciting their background knowledge of the topic, set a purpose for reading comprehension and are empowered to create their own knowledge as they monitor their own comprehension of a text.

Among the studies that adopted a specific approach, Warner and Dupuy (2018) established a significant correlation between consistent use of background knowledge and learners' achievement in reading comprehension; while Priebe *et al.* (2011) documented similar findings in a study that investigated the effect of prior knowledge of passage topics on learners' achievement in reading comprehension, in terms of reading fluency and reduction of reading errors. However, Sadoski and Willson (2006) became even more specific in their study by examining the relationship between each strategy for activating background knowledge and learners' achievement in reading comprehension. The study attributed achievements in reading achievement to two strategies, including pre-teaching vocabulary and analogy. In this regard, discussing the meaning of new words with leaners and creating suitable analogies between items in passages and learners' prior knowledge contributed to better scores in post-reading tests.

In their study, Nur and Ahmad (2017) found a significant relationship between learners' background knowledge and performance in comprehension questions; while Alfaki (2013) reported a significant correlation between learners' background knowledge using text previews and achievement in reading comprehension. The findings of these studies imply that decoding the meaning of new words, creating suitable analogies as well as previewing texts enabled learners to connect their background knowledge and the content of text passages, which forms the cradle of reading achievement. Lastly, Ngwaru and Opoku-Amankwa (2010) reported a strong correlation between readers' prior knowledge and achievement in reading comprehension; thereby, leading the authors to recommend a manifold approach to activating learners background knowledge by applying multiple strategies, including pre-teaching vocabulary, carousal brainstorming, analogy, as well as the know-want-learn.

Based on information obtained from the literature review, the conceptual framework presented in Figure 2 was crafted to show the hypothesised relationship between the independent, moderating and dependent variables used in this study. In this regard, background knowledge, which is the independent variable, was operationalised in terms of five measurable perception statements. The statements were measured using a five-point Likert scale, calibrated as 'strongly agree', 'agree', 'undecided', 'disagree', and 'strong disagree'.

In addition, achievement in reading comprehension (dependent variable) was measured in terms of performance in the post-intervention test, also referred to as post-test scores in some sections of the article. More still, the framework hypothesises that background knowledge does not affect learners' achievement in reading comprehension directly, rather, its effect is moderated by a set of variables pertaining to learners' attributes. In view of this, the analysis factored in the effect of learners' attributes on the causal relationship between background knowledge and achievement in reading comprehension.

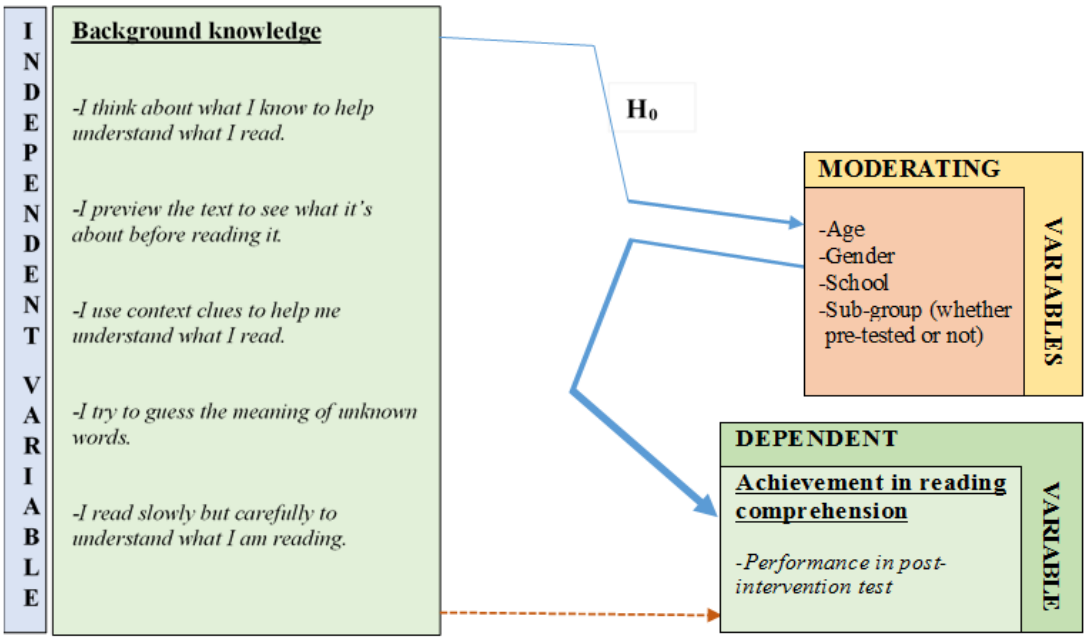


Figure-2. Background knowledge and achievement in reading comprehension.
Source: Researchers (2019).

3. METHODOLOGY

A mixed methods approach was applied to source information on the connection between background knowledge and learners' achievement in reading comprehension. As noted by Sale *et al.* (2002) the mixed methods approach fuses quantitative and qualitative research approaches in order to determine causal relationships between phenomena. Even though the approaches are complementary, each has a unique philosophical basis in terms of assumptions about phenomena, knowledge of the phenomena, and particular ways of knowing the phenomena. Details of the philosophical principles underpinning this study are contained in various publications, including Wong (2014); Ashley and Orenstein (2005); Hussey and Hussey (1997) as well as Easterby-Smith *et al.* (1991).

A quasi-experiment involving the *Solomon Four Non-Equivalent Group Design* was applied to guide the research process. In this regard, eight schools that were involved in the study were randomly assigned to four groups consisting of schools code-named G, H, I and J, as the experimental group, in which teachers of English language were trained on the purpose and correct procedures for applying the interactive approach instruction. The other four schools coded as K, L, M and N were randomly assigned to the control group, which did not receive any treatment.

More still, schools G and H in the experimental group, and schools K and L in the control group were subjected to a pre-intervention test. The other four schools, I and J of the experimental group, as well as M and N of the control group were not pre-tested. However, all the eight schools were post-tested at the end of the experimental period. The design is complimented for being strong in enabling investigators to assess the plausibility of *pre-test sensitisation effects*, that is, whether the act of taking a pre-intervention test influences scores on subsequent administrations of the same test. Details of the design applied in this study are described in various publications, including Symmons (2013) as well as Boushey *et al.* (2006).

The study targeted all public primary schools in Vihiga County, which consists of five sub-counties, namely, Vihiga, Sabatia, Emuhaya, Luanda, and Hamisi. Ministry of Education records show that by the end of 2016, the County had about 361 registered public primary schools. Within the schools, the study targeted all standard six

learners and teachers of English language. Standard six learners were targeted because their participation was likely to contribute positively towards their preparation for KCPE.

A combination of census and purposive sampling was applied at various levels to obtain sample sizes indicated in Table 1, part A. In this regard, all the 5 sub-counties were involved in the study based on the principles of a census, with 4 being involved in the main study and 1 randomly selected for the pilot study. From each sub-county, 2 public primary schools were purposively included in the study, based on two criteria, including having participated in KCPE for at least five years and rural-urban representation. Information on KCPE records was obtained from the county director of education. The process yielded a total of 12 schools, of which 4 were involved in the pilot study, while 8 were involved in the main study. From each school, 1 teacher of English language was purposively selected for the study, based on his/her delivery of English language lessons to standard six learners. Besides, 420 standard six learners were involved in the study, again, based on the principles of census. Of this, 280 were involved in the main study, 140 participated in the pilot study.

Table-1. Sample sizes.

Part A						
Level	**Sample size**			**Method of determination**		
	Main study	**Pilot study**	**Total**			
Sub-counties	4	1	5	Census		
Schools	8	4	12	Solomon four-froup design		
Teachers	8	4	12	Census		
Learners	280	140	420	Census		
Part B						
Sub County	School	Learners			Teachers	
		Girls	Boys	Total	Female	Male
Luanda	G	19	16	35		1
Emuhaya	H	18	16	34	1	
Hamisi	I	20	18	38	1	
Sabatia	J	19	17	36	1	
Luanda	K	22	14	36		1
Emuhaya	L	17	17	34		1
Hamisi	M	19	17	36	1	
Sabatia	N	16	15	31	1	
Total	8	150	130	280	5	3

Source: Researchers (2019).

Table 1, part B shows the distribution of learners and teachers involved in the study by gender. Data collection instruments included a questionnaire for learners, a questionnaire and an interview schedule for teachers; an observation schedule as well as a pre-test and post-test tool for learners. The instruments were pilot-tested in 4 schools, in accordance with principles of the Solomon four non-equivalent group design. Data collection instruments were pilot-tested on 4 teachers and 140 learners between January and April, 2017. Necessary adjustments such as re-statement of unclear questions and instructions; omission of irrelevant questions and correction of typographical errors were effected based on results and suggestions from respondents.

Validity analysis obtained a Content Validation Index of 91.8%, for learners' questionnaire, 87.8% for teachers' questionnaire and 86.5% for the interview schedule. In each case, the results suggest that content validity was above the minimum threshold prescribed by Polit and Beck (2006). Reliability analysis obtained a Cronbach's alpha ranging from 0.82 for the learners' questionnaire to 0.9 for the observation schedule, which were above the minimum threshold for internal consistency based on the judgement criterion developed by Ritter (2010).

Primary data were sourced between May and August, 2017. Authorisation for data collection was obtained from the National Commission for Science, Technology and Innovation, as well as from the University of Nairobi. The process began with the training of teachers, which focused on the purpose and the correct procedure for applying the interactive approach instruction. A pre-intervention test was administered to learners in the experimental group at the onset, followed by treatment, which lasted for three months. The investigator observed eight lessons in both the experimental and control groups to validate responses provided by teachers and learners. After the three months of treatment, learners in both groups were subjected to a post-intervention test, whose purpose was to check whether the background knowledge caused any significant effect on learners' achievement in reading comprehension.

Both quantitative and qualitative techniques were applied to process and analyse data. Quantitative techniques included computation of mean scores, standard deviations, percentages, cross tabulations, as well as computation of independent sample t-tests. One-way analysis of variance was also performed to determine the significance of variations between the scores achieved by all the four groups, in relation to the independent variable. In addition, the null hypothesis was tested using linear regression analysis, which determined the effect of background knowledge on learners' achievement in reading comprehension. The Statistical Package for Social Sciences (SPSS) facilitated quantitative data analysis. Qualitative data were processed and analysed following three steps, including transcription and organisation in line with main themes; description to produce preliminary reports; and thematic analysis, which identified emerging sub-themes under each cluster, as well as patterns and trends of change in learners' achievement in reading comprehension. The methods applied in this study are detailed in various publications, including Ritter (2010); Polit and Beck (2006); Best and Khan (2004); Bryman and Cramer (1998) as well as Nachmias and Nachmias (1996) among others.

Regarding ethical considerations, the investigator sought for informed consent from parents and guardians before involving children in the study. The process involved writing brief consent letters to parents and guardians, explaining purpose of the study, its potential benefits to the children and the importance of voluntary participation. Parents and guardians were further informed about their right to withdraw consent of participation for their children at any time before or during data collection; and that such a move would not affect their relationship with the schools. Besides, learners were required to fill in assent forms; while teachers involved as respondents were also taken through the consenting process. Besides, head teachers, teachers and parents were assured that all the information obtained from the schools and participants would be kept confidential, and used for the purpose of the research only. Confidentiality measures included ensuring anonymity of the schools and participants.

4. RESULTS

The results are organised under four thematic areas, including learners' achievement in reading comprehension, bivariate analysis of learners' profile and achievement in reading comprehension, bivariate analysis of background knowledge and achievement in reading comprehension, as well as multivariate analysis of background knowledge and achievement in reading comprehension. Details are presented and discussed under the following sub-sections.

4.1. Learners' Achievement in Reading Comprehension

The study involved 279 learners, including 142 (50.9%) in the experimental group and 137 (49.1%) in the control group. In the experimental group, standard six teachers of English language were trained on how to correctly apply the interactive approach instruction and urged to apply the same in comprehension reading lessons.

After three months of application, learners in both groups were subjected to a post-intervention test, and the resulting score was designated as 'learners' achievement in reading comprehension'. The study focused on determining if there was any significant difference in the achievement in reading comprehension between learners in the experimental group and those in the control group. In this regard, the t-test for independent samples was applied to determine if there was any significant difference in the mean scores obtained by learners in the two groups. The results presented in Table 2 show that learners in the experimental group obtained a mean score of 35.59 (95% Confidence Interval [CI] = 34.71-37.07); while those in the control group obtained a mean score of 22.32 (95% CI = 21.46-23.18). It's important to note that *n* stands for sample size, *SD* is the standard deviation, *SE* is standard error, *Sig.* is the significance (also known as ρ-value) and *df* is the degree of freedom.

Levene's test for equality of variance determines whether variances between two groups are equal or not. Equal variances across two or more groups are called homogeneity of variance (Levene, 1960). As a rule of thumb, if the significance value (Sig.) for Levene's test is greater than 0.05, then variances between two groups is assumed to be equal; hence, results are read from the first row. But if the significance of Levene's test is less than or equal to 0.05, then variances between the groups is assumed to be unequal; hence, results are read from the second row. In addition, the difference of the mean scores between two groups or samples is indicated by the Sig. (2-tailed) column. Again, as a rule of thumb, if the value of Sig. (2-tailed) is greater than 0.05, then there is no significant difference between the means scores obtained by two groups. However, if the value of Sig. (2-tailed) is less than or equal to 0.05, then there is a significant difference in the mean scores obtained by the two groups.

Based on these principles, the results in Table 2 show that the Sig. value for Levene's test was 0.000, which implies that equal variances were not assumed; hence, the results were read from the second row. In this regard, the analysis obtained a t-statistic of 18.355 with a significance value (Sig. [2-tailed]) of 0.000, which suggests up to 99% chance that the mean scores obtained by learners in the experimental and control groups were significantly different. Given that the mean score obtained by learners in the experimental group (35.89) was higher than that of learners in the control group (22.32), the results suggest up to 99% chance that the training of teachers on how to correctly apply the interactive approach instruction, enhanced learners' achievement in reading comprehension.

4.2. Bivariate Analysis of Learners' Profile and Achievement in Reading Comprehension

Post-test scores were collapsed into four categories of '<20 marks', '20-29 marks', '30-39 marks' and '40+ marks'. This action changed the scale of measurement from interval to nominal and its purpose was to facilitate bivariate analysis. In this regard, the scores were cross-tabulated with learners' proximate attributes, including age, gender, school and sub-county of residence. The results presented in Table 3 show that about one-half of learners, 143 (51.3%), were aged 12 years, 76 (27.2%) were 13 years old, while 43 (15.4%) indicated 14 years. In relation to achievement in reading comprehension, in the 20-29 marks category, 64 (49.6%) learners were aged 12 years, 32 (24.8%) were 13 years old, while those aged 14 years were 20 (15.5%). In the 30-39 marks category, 28 (47.5%) learners indicated 12 years, while 21 (35.6%) were 13 years old. Based on this, the analysis obtained a computed χ^2 value of 13.082, with 12 degrees of freedom and a significance of 0.023, which suggests up to 95% chance that learners' achievement in reading comprehension significantly associated with their age.

Table-2. Variation in post-test scores between learners in the experimental and control groups.

Group		n	Mean	SD	SE	95% CI for mean		Minimum	Maximum
						Lower bound	Upper bound		
Experimental		142	35.89	7.115	0.597	34.71	37.07	21	49
Control		137	22.32	5.099	0.436	21.46	23.18	10	36
Total		279	29.23	9.195	0.551	28.14	30.31	10	49
			Levene's test for equality of variances			t-test for equality of means			
			F	Sig.	t	df	Sig. (2-tailed)	Mean difference	SE Difference	95% CI of the difference
									Lower	Upper
Post-test score	Equal variances assumed		26.97	0.000***	18.249	277	0.000***	13.566	0.743	12.103	15.03
	Equal variances not assumed				18.355	255.89	0.000***	13.566	0.739	12.111	15.022

*,**,*** show significance at ρ<0.1, ρ<0.05 and ρ<0.01 error margins, respectively.

Source: Researchers (2019).

In terms of gender, the learners included 130 (46.6%) boys and 149 (53.4%) girls. In relation to achievement in reading comprehension, the results show that the category of <20 marks included 20 (48.8%) boys and 21 (51.2%) girls, while in the category of 40+ marks were 22 (44.0%) boys and 28 (56.0%) girls. However, the analysis revealed lack of a significant association between learners' gender and achievement in reading comprehension (χ^2 = 0.477, df = 3 & ρ-value = 0.924); which suggests lack of a significant difference between the marks obtained by boys and girls in the post-test.

Table-3. Cross-tabulation of learners' profile and achievement in reading comprehension.

Learners' attributes	Post-test scores										Test results		
	<20		20-29		30-39		40+		Total				
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	χ^2	df	Sig.
Age													
11 years	1	2.4	5	3.9	0	0.0	0	0.0	6	2.2			
12 years	22	53.7	64	49.6	28	47.5	29	58.0	143	51.3			
13 years	11	26.8	32	24.8	21	35.6	12	24.0	76	27.2	13.082	12	0.023**
14 years	7	17.1	20	15.5	7	11.9	9	18.0	43	15.4			
15 years	0	0.0	8	6.2	3	5.1	0	0.0	11	3.9			
Total	41	100.0	129	100.0	59	100.0	50	100.0	279	100.0			
Gender													
Male	20	48.8	62	48.1	26	44.1	22	44.0	130	46.6			
Female	21	51.2	67	51.9	33	55.9	28	56.0	149	53.4	0.477	3	0.924
Total	41	100.0	129	100.0	59	100.0	50	100.0	279	100.0			
School													
G	0	0.0	13	10.1	11	18.6	11	22.0	35	12.5			
H	0	0.0	7	5.4	12	20.3	15	30.0	34	12.2			
I	0	0.0	14	10.9	9	15.3	15	30.0	38	13.6			
J	0	0.0	10	7.8	16	27.1	9	18.0	35	12.5	15.719	9	0.013**
K	8	19.5	19	14.7	9	15.3	0	0.0	36	12.9			
L	4	9.8	28	21.7	2	3.4	0	0.0	34	12.2			
M	14	34.1	22	17.1	0	0.0	0	0.0	36	12.9			
N	15	36.6	16	12.4	0	0.0	0	0.0	31	11.1			
Total	41	100.0	129	100.0	59	100.0	50	100.0	279	100.0			
Sub-county													
Luanda	8	19.5	32	24.8	20	33.9	11	22.0	71	25.4			
Emuhaya	4	9.8	35	27.1	14	23.7	15	30.0	68	24.4			
Hamisi	14	34.1	36	27.9	9	15.3	15	30.0	74	26.5	166.542	21	0.000***
Sabatia	15	36.6	26	20.2	16	27.1	9	18.0	66	23.7			
Total	41	100.0	129	100.0	59	100.0	50	100.0	279	100.0			

*,**,*** show significance at ρ<0.1, ρ<0.05 and ρ<0.01 error margins, respectively.

Source: Researchers (2019).

Table 3 further shows that learners were drawn from 8 public schools, coded as G, H, I, J, K, L, M and N. The results show that 38 (13.6%) learners were sampled from school I, followed by 36 (12.9%) from schools K and M, each; while 35 (12.5%) were sampled from school G. The category of <20 marks, included 15 (36.6%) learners of school N, and 14 (34.1%) of school M. The category of 40+ marks consisted of 15 (30.0%) learners of schools H and I, each; while 11 (22.0%) learners were members of school G. Based on this, the analysis revealed that learners' achievement in reading comprehension significantly varied across the schools (χ^2 = 15.719, df = 9& ρ-value = 0.013), meaning that some schools performed better than others.

Regarding the sub-counties, Table 3 shows that learners were drawn from Hamisi, 74 (26.5%); Luanda, 71 (25.4%); Emuhaya, 68 (24.4%) and Sabatia, 66 (23.7%). The category of 20-29 marks consisted of 36 (27.9%) learners from Hamisi, 35 (27.1%) from Emuhaya and 32 (24.8%) from Luanda. In the upper category of 40+ marks, 15 (30.0%) learners were from Hamisi and Emuhaya sub-counties, each; while 11 (22.0%) lived in Luanda. Based on

this, the analysis revealed a significant variation of learners' achievement in reading comprehension across the sub-counties (χ^2 = 166.542, df = 21& ρ-value = 0.000); which again, suggested that some sub-counties performed better than others.

4.3. Bivariate Analysis of Background Knowledge & Learners' Achievement in Reading Comprehension

Learners were requested to indicate their honest views on each perception statement on a five-point scale, calibrated as 'strongly agree', 'agree', 'undecided', 'disagree', and 'strongly disagree'. The views expressed by learners were cross-tabulated against achievement in reading comprehension. The first perception statement read as *'I think about what I know to help me understand what I read'*. The results in Table 4 show that of the 279 learners, 119 (42.7%) agreed with the statement, while 58 (20.8%) agreed strongly. Contrastingly, 46 (16.5%) learners disagreed, while 28 (10.0%) disagreed strongly. Cumulatively, 177 (63.4%) learners deployed background knowledge to understand texts, while 74 (26.5%) did not. In relation to achievement in reading comprehension, Table 4 shows that in the<20 marks category (n=41), 20 (48.8%) learners applied background knowledge in their reading, while 14 (34.1%) did not. Among those in the 40+ marks category (n=50), up to 42 (84.0%) affirmed the statement, while 4 (8.0%) refuted it. Based on this, the results suggest that learners' achievement in reading comprehension significantly associated with the use of background knowledge to understand texts (χ^2 = 26.266, df = 12& ρ-value = 0.010).

The second perception statement read as '*I preview text to see what it's about before reading it*'. Of the 279 learners, 99 (35.5%) agreed with the statement, while 36 (12.9%) agreed strongly. On the opposite side of the scale, 65 (23.3%) learners disagreed, while 56 (20.1%) disagreed strongly. Cumulative results show that 135 (48.4%) learners previewed texts before reading, while 121 (43.4%) did not. Table 4 further indicates that of the 41 learners in the <20 marks category, 21 (51.2%) affirmed the statement, while 18 (43.9%) refuted it. In the category of 40+ marks (n=50), 29 (58.0%) previewed texts before reading, while 17 (34.0%) did not. Consequently, the analysis revealed up to 95% chance that learners' achievement in reading significantly associated with their practice of previewing texts before reading(χ^2 value = 22.313, df = 12 & ρ-value = 0.034).

The third perception statement postulated that '*I use context clues to help me understand what I read*'. The results in Table 4 show that of the 279 learners, 93 (33.3%) agreed with the statement, while 38 (13.6%) strongly agreed with it. However, 87 (31.2%) learners disagreed, while 31 (11.1%) disagreed strongly. Cumulatively, 135 (48.4%) learners used context clues to understand texts, while121 (43.4%) didn't. In connection to achievement in reading comprehension, in the <20 marks category (n=41), 28 (68.3%) learners rebutted the statement, while 10 (24.4%) affirmed it. Among those in the 40+ marks category (n=50), 25 (50.0%) used context clues to understand texts, while 18 (36.0%) didn't. In view of this, the analysis revealed up to99% chance that learners' achievement in reading significantly associated with the use of context clues to understand texts (χ^2value = 31.408, df = 12 &ρ-value = 0.002).

The study also captured learners' views on the fourth perception statement, suggesting that '*I try to guess the meaning of unknown words*'. Table 4 shows that of the 279 learners, 93 (33.3%) agreed with the statement, while 14 (5.0%) agreed strongly. Those who disagreed were 91 (31.6%), while 40 (20.1%) disagreed strongly. In total, 131 (47.0%) learners did not guess the meaning of new words in their reading, while 107 (38.4%) did so. More still, of the 41 learners in the<20 marks category, 30 (73.2%) did not guess the meaning of unknown words, while 2 (4.8%) did so. However, among those who scored 40+ marks (n=50), 25 (50.0%) affirmed the statement, while 18 (36.0%) confuted it. In view of this, the analysis revealed up to 99% chance that learners' achievement in reading

significantly associated with the practice of guessing the meaning of unknown words when reading (χ^2 value = 26.995, df = 12 & ρ-value = 0.008).

Table-4. Cross-tabulation of background knowledge & achievement in reading comprehension.

Background knowledge practices	Post-test scores									
	<20		20-29		30-39		40+		Total	
	Freq	%	Freq	%	Freq	%	Freq	%	Freq	%
I think about what I know to help understand what I read										
Strongly agree	4	9.8	28	21.7	14	23.7	12	24.0	58	20.8
Agree	16	39.0	43	33.3	30	50.8	30	60.0	119	42.7
Undecided	7	17.1	13	10.1	4	6.8	4	8.0	28	10.0
Disagree	9	22.0	28	21.7	8	13.6	1	2.0	46	16.5
Strongly disagree	5	12.2	17	13.2	3	5.1	3	6.0	28	10.0
Total	41	100.0	129	100.0	59	100.0	50	100.0	279	100.0
I preview the text to see what it's about before reading it										
Strongly agree	2	4.9	17	13.2	6	10.2	11	22.0	36	12.9
Agree	19	46.3	34	26.4	28	47.5	18	36.0	99	35.5
Undecided	2	4.9	11	8.5	6	10.2	4	8.0	23	8.2
Disagree	7	17.1	38	29.5	8	13.6	12	24.0	65	23.3
Strongly disagree	11	26.8	29	22.5	11	18.6	5	10.0	56	20.1
Total	41	100.0	129	100.0	59	100.0	50	100.0	279	100.0
I use context clues to help me understand what I read										
Strongly agree	0	0.0	16	12.4	8	13.6	14	28.0	38	13.6
Agree	10	24.4	46	35.7	26	44.1	11	22.0	93	33.3
Undecided	3	7.3	16	12.4	4	6.8	7	14.0	30	10.8
Disagree	19	46.3	36	27.9	16	27.1	16	32.0	87	31.2
Strongly disagree	9	22.0	15	11.6	5	8.5	2	4.0	31	11.1
Total	41	100.0	129	100.0	59	100.0	50	100.0	279	100.0
I try to guess the meaning of unknown words										
Strongly agree	1	2.4	5	3.9	5	8.5	3	6.0	14	5.0
Agree	1	2.4	47	36.4	23	39.0	22	44.0	93	33.3
Undecided	9	22.0	17	13.2	8	13.6	7	14.0	41	14.7
Disagree	20	48.8	42	32.6	17	28.8	12	24.0	91	32.6
Strongly disagree	10	24.4	18	14.0	6	10.2	6	12.0	40	14.3
Total	41	100.0	129	100.0	59	100.0	50	100.0	279	100.0
I read slowly but carefully to understand what I am reading on										
Strongly agree	10	24.4	25	19.4	10	16.9	16	32.0	61	21.9
Agree	10	24.4	55	42.6	29	49.2	25	50.0	119	42.7
Undecided	3	7.3	11	8.5	5	8.5	2	4.0	21	7.5
Disagree	15	36.6	30	23.3	7	11.9	4	8.0	56	20.1
Strongly disagree	3	7.3	8	6.2	8	13.6	3	6.0	22	7.9
Total	41	100.0	129	100.0	59	100.0	50	100.0	279	100.0

Source: Researchers (2019).

Learners also indicated their thoughts regarding the perception statement saying that '*I read slowly but carefully to understand what I am reading on*'. The results in Table 4 show that, 119 (42.7%) learners agreed with the statement, while 61 (21.9%) agreed strongly. However, 56 (20.1%) disagreed, while 22 (7.9%) expressed strong disagreement. Collectively, up to 180 (64.5%) learners read slowly but carefully in order to understand texts, while 78 (28.0%) didn't. In relation to achievement in reading comprehension, results show among the learners in the <20

marks category (n=40), 20 (48.8%) endorsed the statement, while 18 (43.9%) disproved it. At the far end among those who scored 40+ marks (n=50), 41 (82.0%) read slowly to understand texts, while 7 (14.0%) didn't. Based on this, the analysis indicated that learners' achievement in reading significantly associated with the practice of slow but careful reading of texts to facilitate understanding (χ^2 value = 23.926, df = 12 & ρ-value = 0.021).

Furthermore, learners' views about the five reading practices were aggregated in order to estimate the extent to which they applied background knowledge in their reading. In order to bring out the aspect of extent to which background knowledge was applied in the reading process, the output categories were renamed as 'very consistent', 'consistent', 'undecided', 'inconsistent' and 'very inconsistent'. In this regard, learners who strongly agreed with the perception statements were deemed to be 'very consistent' in applying background knowledge, while those who 'strongly disagreed' were considered to be 'very inconsistent' in applying the same.

The output variable was cross-tabulated with *learners' group* in order to determine variation in the extent to which learners in the experimental and control groups applied background knowledge when reading. The results in Figure 3 show that of the 279 learners, 133 (47.7%) were consistent in applying background knowledge in their reading, while 21 (7.5%) were very consistent. Those who were inconsistent were 65 (23.3%), while 13 (4.7%) were very inconsistent.

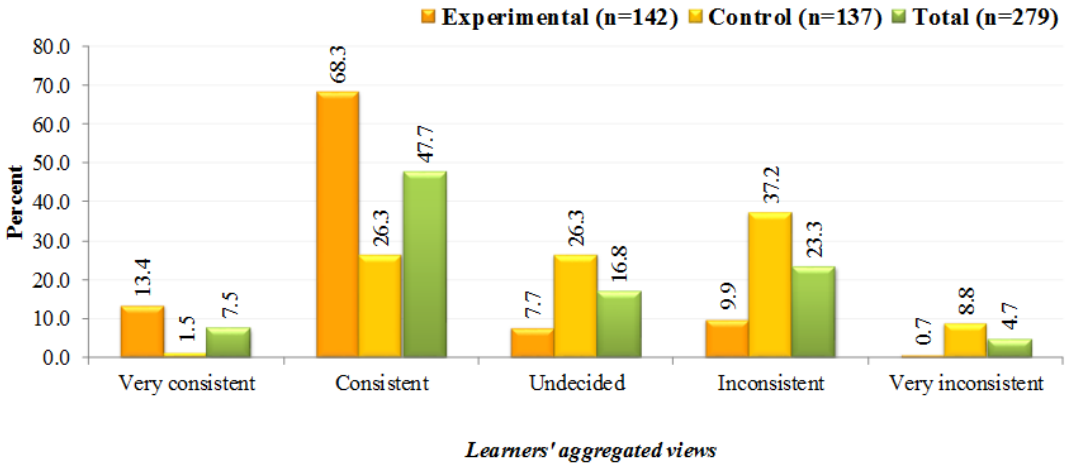


Figure-3. Learners' aggregated views on the use of background knowledge skills.

Source: Researchers (2019).

The results further show that 97 (68.3%) learners in the experimental group against 36 (26.3%) in the control group were consistent in applying background knowledge skills. Those who were very consistent included 19 (13.4%) learners in the experimental group against 2 (1.5%) in the control group. Contrastingly, 51 (37.2%) learners in the control group compared to 14 (9.9%) in the experimental group were inconsistent in applying background knowledge. Those who were very inconsistent included 12 (8.8%) learners in the control group against 1 (0.7%) in the experimental group. Collectively, 116 (81.7%) learners in the experimental group compared to 53 (38.7%) in the control group were consistent in applying background knowledge when reading comprehension passages. However, 63 (46.0%) learners in the control group against 15 (10.6%) in the experimental group were inconsistent in using the same skills. Whereas most learners who applied background knowledge consistently were in experimental schools, the majority of those who were inconsistent were based in control schools. In view of this, the analysis revealed up to 99% chance that the consistency of applying background knowledge significantly associated with learners' groups (χ^2 value= 85.344, df = 4 & ρ-value = 0.000); meaning that more learners in the experimental group than in the control group were consistent in applying background knowledge in their reading.

4.4. Multivariate Analysis of Background Knowledge & Achievement in Reading Comprehension

The ultimate aim of the study was to determine effect of background knowledge, as an aspect the interactive approach instruction, on learners' achievement in reading comprehension. In this regard, background knowledge (independent variable) was regressed against learners' achievement in reading comprehension (dependent variable). Learners' attributes (moderating variables) were included in the process to influence the causal relationship between background knowledge and learners' achievement in reading comprehension; thereby, provide the best estimate. The analysis process generated two models–one for the experimental group and one for the control group.

The results presented in Table 5 show that in both models, background knowledge caused a positive effect on learners' achievement in reading comprehension (Model 1: *Beta* = 0.412, t = 1.965; Model 2: *Beta* = 0.403, t = 1.902). However, the effect seems to be bigger among learners in the experimental group than among those in the control group, judging from the magnitude of *Beta* and t-statistic. The variation suggests that trained teachers were likely to be more effective in activating learners' background knowledge than their untrained colleagues. In model 1, the results show up to 95% chance that the effect was significant (ρ = 0.041), while in Model 2, the effect was significant at 90% confidence level (ρ = 0.059). Consequently, the null hypothesis (H_0) stating that *background knowledge has no significant effect on learners' achievement in reading comprehension* was rejected in both models for being untrue.

Table-5. Effect of interactive approach instruction on learners' achievement.

Model		Unstandardized coefficients		Standardised coefficients	T	Sig.
(1)	(2)	B(3)	Std. error(4)	Beta(5)	(6)	(7)
1	(Constant)	32.351	2.745		5.631	0.000***
	Background knowledge	0.623	0.208	0.412	1.965	0.041**
	Age	0.364	0.682	0.045	0.533	0.595
	Gender+	-0.002	1.2	0	-0.002	0.999
	School+	-1.496	1.198	-0.235	-1.249	0.214
	Sub-group+	4.346	2.665	0.306	1.631	0.105
2	(Constant)	26.574	2.732		4.095	0.000***
	Background knowledge	0.585	0.141	0.403	1.902	0.059*
	Age	0.325	0.405	0.059	0.801	0.425
	Gender+	-0.053	0.747	-0.005	-0.071	0.944
	School+	-1.35	0.74	-0.294	-1.825	0.07
	Sub-group+	2.77	1.639	0.273	1.691	0.067*
Dependent variable: Post-test score						

*,**,*** show significance at ρ<0.1, ρ<0.05 and ρ<0.01 error margins, respectively.
+Converted to a dummy variable before inclusion into the linear regression analysis.

Source: Researchers (2019).

The results are in line with those obtained through the qualitative approach, using key informant interviews and observations. In this regard, qualitative analysis revealed that application of background knowledge was near universal in experimental schools, but sub-optimal in control schools. Participants attributed the finding to variation in procedures used by teachers in the two groups to activate learners' background knowledge. The analysis further revealed four key strategies through which learners' background knowledge was actuated, including *pre-teaching vocabulary, carousal brainstorming, analogy and K-W-L.*

Regarding the extent to which the strategies were applied, the analysis revealed that *pre-teaching vocabulary* was applied nearly universally in both groups to activate learners' background knowledge. In this regard, learners were often taught the meaning of new words before reading passages; and the majority of such learners were in experimental schools. Even though the use of *carousal brainstorming* to actuate background knowledge was below average in both groups, it seemed to be more common in experimental than in control schools. More still, the use of

analogies was far below average in both groups; however, participants hinted that strategy was relatively less common in control than in experimental schools.

Contrastingly, the *K-W-L* strategy was never applied by teachers in both groups, due to various reasons, including the assumption that comprehension of passages develop naturally as long as learners know the meaning of new words; teacher domination of reading lessons, through lengthy and detailed explanations of new words, as provided for in their guide books; which made reading lessons teacher-centred, rather than learner-centred. More still, the dominance of pre-reading explanations of new words before reading prompted most teachers to avoid strategies perceived to be more demanding in terms of time and resources, such as K-W-L and carousal brainstorming. Consequently, the application of such strategies was primarily encumbered by inadequacy of instructional resources and heavy workload, which was exacerbated by the teacher shortage.

5. SUMMARY AND CONCLUSIONS

The study aimed at determining effect of background knowledge on learners' achievement in reading comprehension in Vihiga County. Its purpose was to generate information that should support policy and programming interventions targeting the training, management and motivation of teachers, to improve their effectiveness in activating learners' background knowledge. The information should also prod further research on the subject of leaners' achievement in reading comprehension, not only in Kenya but also in other developing countries.

Even though background knowledge caused a positive effect on learners' achievement in reading comprehension in both the groups, the variable's effect appeared stronger in the experimental than in the control group, judging from the *Beta* weights and t-statistic values. The findings suggest that training teachers on how to correctly deliver the interactive approach instruction is likely to improve their effectiveness in activating learners' background knowledge. In both groups, the variable's effect was found to be statistically significant, which led to rejection of the null hypothesis for being untrue. This implies that background knowledge significantly affected standard six learners' achievement in reading comprehension.

Of the four strategies for activating learners' background knowledge, *pre-teaching vocabulary* was the most commonly applied by teachers in both groups. However, between the two groups, the strategy was applied consistently by more teachers in the experimental than in the control group. The use of *carousal brainstorming* and *analogies* was below average in both groups; but relatively less common in the control group. Lastly, the *K-W-L strategy* was hardly used by teachers in both groups due to various factors, including the assumption that comprehension of passages develops naturally, teachers' domination of reading lessons through lengthy explanations of new words, inadequacy of instructional resources and budgetary provisions, as well as lack of innovation and motivation among teachers. Heavy workload also denied teachers the time required to apply the strategy.

In view of the above, it's worth deducing that training teachers of English language on the correct procedures for activating learners' background knowledge skills is likely to add value by making them more effective in lesson delivery. In addition, such training is likely to inspire teachers to go an extra mile in their efforts to activate learners' background knowledge during reading lessons. Despite the positive effect of training on teachers' effectiveness in developing learners' background knowledge skills, over-application of the *pre-teaching vocabulary* strategy is an issue that deserves attention.

On this note, Keen and Zimmerman (1999) observe that activating learners' background knowledge skills enables them to make three types of connections with texts, namely, connection with self-accumulated knowledge,

connection with the real world situation, as well as connection with pre-existing texts on the same subject. Establishing such connections before, during, and after reading requires learners to develop multiple skills - something which may not be accomplished using just a single strategy. More explicitly, the *pre-teaching vocabulary* strategy alone is too insufficient to fully activate learners' background knowledge and to maximise achievement in reading comprehension. This brings to the fore the need for teachers to embrace other strategies, including *carousal brainstorming, analogies* and *K-W-L*, in order to synergise learners' background knowledge.

Therefore, concerned stakeholders should prioritise sensitisation of teachers on the need to apply multiple strategies for activating learners' background knowledge. A multi-strategy approach should further be stimulated through by providing appropriate instructional resources in schools and improving budgetary allocation. It's worth noting that providing teachers with the right skills for activating learners' background knowledge may not necessarily translate to desired results, until such teachers are supported and facilitated to perform their best. However, training teachers and provision of resource materials are capital intensive interventions, which take long to be realised in resource-poor countries. For this reason, stakeholders should focus on promoting innovation and encouraging the use of alternative resources to supplement conventional instructional materials.

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