Digital Interactive Images and Tertiary Students Motivation, Performance and Retention in Reading Comprehension

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Abstract:- The study investigated the effects of Digital Interactive Multimodal Reading strategy (Images) on students' motivation, academic performance and retention in reading comprehension using a quasi-experimental design of pre-test, post-test control type and descriptive survey on 80 University students' selected from a population of 400 students in English Studies, year II of the University of Port Harcourt using the purposive sampling techniques. Three research questions and three hypothesis are used to direct the course of the research and the instruments for the study are; Modified Multimodal Reading Motivation Questionnaire (MMRMQ) and Students Performance Test on Reading Comprehension (SPTRC). The reliability coefficients of 0.82 and 0.78 were obtained using Kuder-Richardson 21(KR- 21) formula. The instruments were validated by two experts in English Studies and one expert in measurement and evaluation unit of the University of Port Harcourt. Data obtained using MMRMQ and SPTRC were analyzed using the descriptive statistics of mean (mean percentage) and inferential statistics of analysis of covariance (ANCOVA). Findings show that there is a significant difference between students' performance and retention in reading comprehension of students who were taught using the Digital Interactive Multimodal Reading strategy (Images) and those taught using conventional Lecture Method (CLM). However there is no significant difference between motivation when taught using Digital Interactive Multimodal Reading strategy (Images) and those taught using conventional Lecture Method (CLM). Based on these findings, it is recommended that Digital Interactive Multimodal Reading strategy (Images)or visuals be incorporated into reading instructions in higher institutions in order to improve students' performance and retention in reading comprehension.

I. INTRODUCTION

The innovations in information and communication technology (ICT) have affected changes in English language learning due to the availability of extensive source and opportunities that the internet offers. Language learners have new digital tools, methods and strategies, advantaged by the attention driven multimodalities and easier access to computer, phones and the enhancing properties of the application of technology in education. ICT has become commonly used in education due to the effect and exciting use of devices and programs to access, retrieve, convert, store, manipulate, organize and present information to innumerable users (Gray & Blads, 2005, Harridi, Mesikat, Rezaee & Jafari, 2011; Richard, 2008).

Reading has been recognized as an art capable of transforming man's life and his entire society as well as academic purposes. Reading is tied to success in academic evaluation or grade points. Emenyonu (2003) argued that students' reading is insufficient since their performance in external examinations plummeted at a persistent rate. The essence of the digital text, video, images, hyperlinks, audio (sound) effects, graphic designs are to cater for the individual differences and identify their difficulties in reading and improve on it; (Copper & Kiger, 2008; Serafini, 2012). The use of digitalized modalities for reading has effect on students' dexterity in handling hard and soft copies of materials. It equips students to overcome difficulties in fluency, phonetic awareness, keyword knowledge (KWL) and improve skills in reading for academic purpose. One of these innovative strategies- digital images- is an additional tool to the conventional text based materials. Digital images affords the utility of colour, size and different perspectives to concepts which is the attraction of the web.

Screen based textual materials are represented in words-picture interface and the nature of images and texts vary considerably from one textual passage to another. The images infer stated words while in some text the images are predominant with key word explanation. Sometimes, students' encounter images in combination with language and is now very crucial in literacy learning and development (Richards, 2001; Luke, 2003).

In the National Curriculum Board (2008) in Britain, multimodal texts throughout the school years incorporate a growing understanding of how visual texts work, their

structures, interpretation and the effects of certain features (p.12)

Digital readers encounter many images and text materials in which co-articulation of image and language, interpretation of meanings and comprehension is required. Furthermore, in contemporary re-conceptualization of literacy, words are not presented alone but includes screen based images/texts which enhances students' interpretation and construction of meaning.

In advanced studies, a number of children use images to answer text questions in a digital platform. The use of images to access items is observed in the works of Unsworth, Thomas &Bush, (2004). According to Chan (2009) students' face some difficulties in online reading comprehension, involving images and languages such as the difficulty of the different types of images/text relations. Images presented in three dimensions are more explicit than those in two dimensions. 2D's pose problems of exactitude or precision than those of the 3D's, for example an image of a life cycle of a millipede found in an Australian museum in 2003 was shown as an image in the internet for students to identify the number of pairs of the legs; only 91% of the students provided the answer (three pairs of legs) while 9% of the students could not. Unsworth and Chan (2009) concluded that integrative reading of images and languages in Multimodal texts are clearly important in reading both traditional paper media texts and online texts.

Furthermore, Kress (2003) delineated images on computer screen and printed materials in terms of semiotic materials or resources used to create them and opined that differences could result from students' potential of meaning making. The shift of readers from linguistic focus to a multimodal one requires readers to navigate, design, interpret and analyze texts in a new and more interactive ways (Anstey and Bull, 2006).

Viewing an image with or without interpreting clues in a digital platform, means that students need to gain more knowledge of the visual meaning making systems deployed in images. This strategy extends the cognitive-based reading comprehension that is commonly used in interpreting written texts. Aiello (2006) suggested that such exercise should involve accounting for their cultural norms and perceptual qualities of images, built-in knowledge of visual grammar and semiotics. The brain has a major part to play in creating perception, this is carried out when it automatically filters, discards and selects information that compares it to an individual's stored record hence making the images which are visualized to be processed and given such meaning that are not only contextual but interconnected with its social or cultural meaning. This ascribed meaning on the brain becomes temporary since it is likely to change.

A. Statement of the Problem

The traditional reading of the print materials has encouraged teachers' use of the conventional Lecture Method. One difficulty with this method of learning is the teacher-centeredness of the approach and consequent poor performances of students, persistently. Meaningful teaching infers students' motivation, improved performance and retention of materials, overtime. Secondly, most reading through browsing is often fragmented and discontinuous. The reading offered in digital platforms are no longer discontinuous but a composite activity involving deep interaction with textual passages, picture, audio and visual modes. Students respond to the stimuli of links, pictures, videos and hence rekindling the warning motivation. For EFL learners, understanding the language through reading require knowledge of vocabularies, fluency, phonetics and keyword knowledge which is attainable when literatures are presented in images/word text interactive modes. Digital Interactive Images and word interface is investigated to see whether tertiary students' motivation, performance and retention would be enhanced in reading comprehension.

B. Aim and objectives of the study

The aim of the study is to determine the effects of Digital Interactive multimodal reading strategy (Images) and tertiary students' motivation, performance and retention is reading comprehension specifically, the objectives of the study are:

- To evaluate the effect of Images as a Digital Interactive Multimodal Reading Strategy on students' motivation in reading comprehension.
- To investigate the effect of Digital Interactive Multimodal Reading Strategy (Images) on students' performance in reading comprehension.
- To determine the effect of Digital Interactive Multimodal Reading Strategy (Images) on students' retention in reading comprehension.

C. Research Question

The following research questions were formulated to guide the study.

- What is the effect of Digital Interactive Multimodal Reading Strategy (Images) on students' Motivation in Reading comprehension?.
- What is the effect of Digital Interactive Multimodal Reading Strategy (Images) on students' performance in reading comprehension?.
- How does Digital interactive Multimodal Reading strategy (Images) enhance students' retention in reading comprehension?.

D. Research Hypotheses

The following null hypotheses (Ho) were stated to guide the study, at 0.05 significance level.

- **Hypothesis one (Ho1):** There is no significant difference between mean scores of students taught using Digital Interactive Multimodal Reading Strategy (Images) and

those taught using conventional lecture Method in reading comprehension.

- **Hypothesis Two (Ho2):** There is no significant difference between mean scores students motivation taught using Digital Multimodal Reading Strategy (Images) and those taught using conventional Lecture Method in reading comprehension.

- **Hypothesis Three (Ho3):** There is no significant difference between the retention of students taught reading comprehension using the Digital Multimodal strategies (Images) and those taught using conventional Lecture Method.

E. Significance of the study

This study is aimed at applying Digital Interactive Multimodal Reading Strategy (Images) to improve students' motivation, performance and retention in reading comprehension. Those to benefit from the findings of this study are the students whose affinity for Digital text comprehension; change in learning environment from the traditional paper reading to textual reading on screen and word/image interactive motivational effect would improve their performance and retention in reading. Furthermore, the teacher would benefit from the shift in pedagogy to be motivated in future use of DIMRS in handling concepts in reading. Educational planners and authorities in tertiary institutions would see the need from the findings of this study to provide for the English laboratory essential ICT resources (soft ware and hardware) in order to ease accessibility and engagement of students and teachers for learning.

F. Delimitation of the study

The study is delimited to use of computer mediated text passages with content related images on areas of the market place, destitution among children and gender and access to secondary school education involving 40 tertiary students' of the University of Port Harcourt using a research method involving experimentation. Furthermore, the study is delimited to constructs of motivation, performance and retention using only Digital Interactive Multimodal Reading Strategy (Images).

II. THEORETICAL/ CONCEPTUAL FRAMEWORK

The main theories underlying the Digital Interactive Multimodalities are the framework of Mayer and Fowlers theory of e-learning (2001) Paivio's dual coding theory (1986), cognitive theory of multimodal learning and social constructivist theory. The e-learning maps out stages or categories which learners must pass through in order to achieve meaning during the learning process, these include conceptualization stage where there is exposure, interaction among learners and exposure to a new task or concepts; construction, where learners make their constructs based on the learning process and understanding and dialogue. In e-learning these concepts are built in electronically which would require learners' ability to manipulate interactively the content

and gain meaning. Some of these concepts are conceptualized in a word-picture or visual-verbal representations. Paivio (1986) stated that human cognition is unique and deals simultaneously with language and non-verbal objects and events. The theory emphasized that pictorial cues are stored in one's memory while the non-verbal cues interface to supplement recall of information stored in both the verbal and non-verbal representations. The theory, furthermore, identifies the associative processing of information and more so of the word-word, word-picture pairs during which understanding is verbal or coded in pictorial form, the social constructivist idea is explicit. Learners through the interface with contents, develop some level of scaffold where he/she is more interested in capturing the meaning of the content, become more knowledgeable having attained the zone of proximal development to ascribe meaning to the content based on the learners' understanding. The leaner make meaningful learning when an appropriate method (as interventions) are used to create a scaffold. In the context of reading comprehension, the use of the video clips in a multimodal interactive platform provides this needed scaffold for which learning competence of the leaner is attained.

The main theories considered in this study is paivio's dual coding theory, social constructivist theory and the cognitive theory of multimodal learning. Mayer's approach to the theory of cognitive theory of Multimedia Learning is that two separate information channels (auditory and visual processing of information have integrating information based on prior knowledge. The interaction provided using coherent verbal, pictorial information guiding the learners to select relevant words and images and reduce the load for a single processing channel has created improved motivational attitudes of learners. The use of these channels as pedagogical methods enhance students' effective interpretation of texts (Unsworth and Chan, 2009).

When adequate pedagogy that is learner-centred is in use, learners make their constructs based on the understanding developed during the learning process. The three main themes of the constructivist theory are the social interaction, more knowledgeable others and the zone of proximal development. When learners are exposed to adequate learning method, a scaffold to a level of actively interpreting their world is provided and amazing knowledge without the guidance of peer or adult teacher is gained. Digital interactive Multimodal Reading creates this environment and improves students' reading comprehension, motivation, performance and retention.

III. METHODOLOGY

The study adopted a quasi-experimental design of the pre-test-post test, control design and descriptive survey on 40 university of Port Harcourt undergraduates in an intact class. Two instructional strategies adopted are the use of Digital Interactive Multimodal Reading Strategy (Images) and the

conventional Lecture Method (CLM). The undergraduates are in year II of English Studies Department. The instruments used for the study are the Modified Multimodal Reading Motivation Questionnaire (MMRMQ) designed by Smith/Cavanaugh & Moore (2011). MMRMQ consist of 20 items weighted in Likert four point scale of SA (4marks), A (3marks), SD (2marks) and D (1mark), and the Students' Achievement Test on Reading Comprehension (SATRC) which consists of a comprehension passage on the Clay soil and the Students Achievement Test on Reading Comprehension(SATRC) as post test after two weeks ,where students' vocabulary knowledge, comprehension knowledge, performance and retention are measured. The reliability coefficients of the instruments are 0.82 and 0.78 respectively. The face validity and were determined by experts in measurement and evaluation, and an expert in English as a Foreign Language (EFL).

The experimental group was taught reading using the Digital Interactive Multimodal Reading Strategy (Image) while the control group was taught reading using the conventional Lecture method (CLM). Instructional packages were designed using lesson plans showing activities of students in a Digital Interactive Multimodal Reading strategy specifying the nature and activity of the teacher. The responses on the MMRMQ and SATRC were analyzed using the descriptive mean analysis of (& mean percentage) to proffer answers to the stated research questions while the inferential statistics of analysis of variance (ANOVA) and analysis of covariance (ANCOVA) were used to test the hypotheses at 0.05 of significance.

IV. RESULTS AND DISCUSSION

Research Question 1: What is the effects Digital interactive Multimodal strategy (Images) on students motivation in reading comprehension.

Table 1: Enhancing students motivation in reading using digital interactive multimodal strategy (images).

Group	Pre-test Mean motivation Score	Post test Mean Motivation Scores	Gain	Gain %
Experimental (images) Control	60.33 55.93	62.36 57.48	2.03 1.55	23.65

Table 1 shows that the mean pretest mean motivation scores of the experimental group(images) is 60.33 while that of the control group is55.93.The experimental group (images) had post test score of 62.36 while the control group had57.48 .The mean difference of the experimental group is 2.03 while that of the control group is1.55.The percentage gain of the experimental against the control group is 23.65% hence the performance of the experimental group is greater than those of the control group(2.03>1.55) at 23.65%. Students exposed to

learning reading comprehension by use of the digital interactive multimodal reading strategy (images) have greater motivation than those taught using conventional lecture method.

Table 2: Digital interactive Multimodal Reading strategy (Images) and students Performance in reading comprehension

Group	Mean Pre-test	Mean Post-test	Mean Difference	Mean Gain %
Experimental (images) Control	19.05 14.13	21.08 15.68	2.03 1.55	23.64

Table 2 Shows that the students taught using Digital Interactive Multimodal Reading Strategy (images) had a pretest score of 19.05 while the mean post test score is 21.08. Those who were taught using the lecture method (control) had mean pretest score of 14.13 and mean post test score of 15.68. The mean difference of the experimental group is greater than the mean score of the control group (2.3>1.55) at mean gain% of 23.64. The students in the experimental group had better performance at the experimental group than those students in the control group. (21.08>15.68).

Table 3: Digital Interactive Multimodal Reading Strategy (Images) and student's retention In Reading Comprehension.

Group	Mean Post -Test Score	Mean Delayed Post Test Score	Mean Different	Gain %
Experimental (images) Control	21.58 15.75	24.11 17.37	2.53 1.62	35.97

Table 3 shows the Digital Interactive Multimodal Reading Strategy (images) and students retention in reading comprehension. Students taught reading comprehension using DIMS (Images) had mean delayed post test score (Retention) of 24.11 while the control group (Lectured Method) had 17.37. The mean difference of the experimental group and control are 2.53 and 1.62 respectively. Gain percentage of 35.92% reveals that the students in the experimental group had more retention of concepts in reading comprehension than those taught using conventional method (CLM) [24.11>17.37], hence, the use of images enhanced students retention in reading comprehensions by 35.97%.

Hypothesis one (Ho1): There is no significant difference between mean scores of students taught using Digital Interactive Multimodal Reading Strategy (Images) and those taught using conventional lecture Method in reading comprehension.

Table 4: Summary of Analysis of Covariance (ANCOVA) on students' performance taught using Digital Interactive Multimodal Reading Strategy (Images) and those taught using conventional Lecture Method.

Tests of Between-Subjects Effects

Dependent Variable: POST_TEST

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	182.097[a]	2	91.049	8.395	.001	.179
Intercept	1254.420	1	1254.420	115.663	.000	.600
PRE_TEST	71.647	1	71.647	6.606	.012	.079
TREATMENT1	33.075	1	33.075	3.070	.085	.038
Error	835.103	77	10.845			
Total	35962.000	80				
Corrected Total	1017.200	79				

a.   R Squared = .179 (Adjusted R Squared = .158)

Table 4 Shows That The F-Calculated Value At Df (2,79) Is 3.050 While The Theoretical Value Is 3.07. At 0.05 Significant Level, The F-theoretical value is slightly greater than the F-calculated value hence the null hypothesis is upheld. There is no significant difference between mean scores of students taught using Digital Interactive Multimodal Reading Strategy (Images) and those taught using conventional lecture Method in reading comprehension. Furthermore, at 0.085 significant level, and degree of freedom df (2.79), the treatment of use of images is statistically significant.

Hypothesis Two (Ho2): There is no significant difference between mean scores students motivation taught using Digital Multimodal Reading Strategy (Images) and those taught using conventional Lecture Method in reading comprehension.

Table 5: T-test of students motivation when taught using Digital Interactive Multimodal Reading Strategy (images) and conventional lecture method.

Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Motivations Equal variances assumed	1.798	.184	-.050	78	.961	-.10000	2.01827	-4.11807	3.91807
Equal variances not assumed			-.050	71.899	.961	-.10000	2.01827	-4.12345	3.92345

Table 5 shows that at df (78) the t-calculated value is 0.050 while the t-theoretical value at df (78) is 1.980 hence the null hypothesis is upheld. There is no significant difference between mean scores of students' motivation taught using Digital Multimodal Reading Strategy (Images) and those taught using conventional Lecture Method in reading comprehension.

Hypothesis Three (Ho3): There is no significant difference between the retention of students taught reading comprehension using the Digital Multimodal strategies (Images) and those taught using conventional Lecture Method.

Table 6: Summary of analysis of covariance (ANCOVA) on students' retention taught using Digital Interactive Multimodal Reading Strategy (images) and those taught using conventional lecture method.
Tests of Between-Subjects Effects
Dependent Variable:　RETENTION1

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	638.727[a]	2	319.363	23.482	.000
Intercept	1159.940	1	1159.940	85.288	.000
PRE_TEST	22.677	1	22.677	1.667	.200
TREATMENT1	409.674	1	409.674	30.122	.000
Error	1047.223	77	13.600		
Total	29140.000	80			
Corrected Total	1685.950	79			

a. R Squared = .379 (Adjusted R Squared = .363)

Table 6 indicates that the F-calculated value of 13.60 is greater than the F-theoretical value of 3.07 at 0.05 significant levels. Since F-calculated value is greater than the theoretical value, the null hypothesis of no significant difference between mean scores of students taught using both strategies is rejected, hence there is a significant difference between the retention of students taught reading comprehension using the Digital Multimodal strategies (Images) and those taught using conventional Lecture Method.

V.　DISCUSSION OF FINDING

The findings of this study agrees with those of Ackerman and Goldsmith (2011) that students reading rate, comprehension and recall were improved when computer presentation using images were used despite students' facing some difficulties in reading. Digital reading tools has brought about increase in the performance of students reading linear texts on computer screen;

(Mangen, Walgermo and Bronnick 2013). The finding is in line with the findings of AL Laiham (2016) and Ihmaid (2017) who investigated in different researches, the effectiveness of using technology based learning in developing sixth graders English vocabulary and retention. These findings however, does not agree with Kuhail (2017) that using digital platform showed no statistical significant difference between the mean scores of the experimental groups & and control group in an EFL classroom. The effectiveness of the innovative Digital Interactive Reading Strategy is mainly because of the word-picture (Images)-word interface that pre-disposes partial understanding of the text passages made memorable due to the pictorial representation, eases students making constructs as active participants in learning.

VI.　CONCLUSION

The use of Digital interactive multimodal reading strategy (Images) is statistically significant in improving students motivation, performance and retention in reading among tertiary students.

RECOMMENDATIONS

The following recommendation are made based on the findings of this study.

- Digital Interactive Multimodal Reading strategy (images) should be used to teach concepts in reading if the performances of the students would improve.
- Student's use of Digital multimodal strategies would enhance their fluency, vocabularies key word knowledge, dexterity in use of computers and effective handling of information in the digital platform hence tertiary institutions should equip laboratories with relevant technology for effective learning in Digital Interactive Multimodal spaces.

CONTRIBUTION TO KNOWLEDGE

Digital Interactive Multimodal Reading Strategy (Images) significantly improve students' Motivation to learn, performance and retention in reading comprehension.

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