

INFOGRAPHICS AND ITS EFFECTS ON PRE-SERVICE TEACHERS' ACADEMIC ACHIEVEMENT AND ATTITUDE TOWARDS MEDIA SYSTEM

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ABSTRACT: *Media system is a very all-embracing and all-inclusive course and as such very lucrative. It's a course that comprises Educational Technology, Instructional Technology, Instructional System Design and their Models e.t.c. Using varieties of strategies in the teaching and learning of this course can improve learners understanding, engagement and hands-on and also facilitates learning. Therefore, in Media system, some instructional strategies should be brought to the classroom which one of them is infographics. The delimitation of this study is infographics and their effect on pre-service teachers' academic achievement and attitude in Media system. The study is important as it can facilitate learning, contribute to design of new instructions to be used in the classrooms. The design for the study was quasi-experimental design. Solomon Four Group Design was also used. The result shows that the use of infographics increases the pre-service teachers' academic achievement and their attitude levels. More so, infographics provide the facilitators with variety of ideas in selecting, constructing and using varieties of instructional strategies. Infographics cut across all level of learning and should be recommended for effective and efficient delivery of instructions.*

KEYWORDS: Media System, Infographic, Pre-Service Teachers', Academic Achievement, Attitude Level

INTRODUCTION

Background

Media system includes design, development, utilization, management and evaluation of resources. The domains are not mutually exclusive of one another but rather represent a symbiotic relationship to one another. Media system is not a linear process but a circular, recurrent set of processes that continuously work together, Hsu, Hung, & Ching (2013). Each domain not only leads to the next but impacts the next. At the very basic level, a method or style of delivering instruction to students is devised and then put into action. The delivery technique and students are then monitored to determine the effectiveness of the delivery process. This feedback data then gives the teachers mechanism to measure the effectiveness of the instruction and a chance to improve upon the teaching by introducing new strategies and eliminating ineffective strategies of instruction. Teaching in a wide-ranging course of study involves the use of a wide range of instructional strategy, Seels, & Richey (1994). In this study, a variety of instructional strategy used in media system is more compared to other courses, thus, media system needs to be taught in the class in various ways using instructional strategy that enhances and improves teaching and learning, Spector (2015).

However, the strategy to be used in the classroom should not be very detailed, they should be appropriate for the students' basic knowledge and skill level, simple and clear-cut and designed to give a certain message. In the modern world where technology is evolving rapidly, quick

developments and innovations are experienced in very different fields, these rapid innovations can be considered as a mainstream phenomenon that benefits the society, Ampa (2015). Therefore, increasing power of information in the modern world and easy access to information lead to bombardment of people with information, which requires a careful selection of useful information. One of the effective materials that can be used to this end are infographics, Williams (2002).

Infographic production started as early as the period of early hunting people's drawing of hunting figures on the walls of the caves. Although these drawings and designs are considered to be primitive, they have been used for many purposes in the history. For example, the maps which tells Napoleon's excursion to Moscow in 1812 and the number of soldiers lost during this excursion and the reasons why they were lost and the diagram and graphic Florence Nightingale draw to tell causes of death of English soldiers in the war in Crimea have importance place in the historical development of infographics, Smiciklas (2012).

Infographics today are used in all facet of life including education, market, companies, medicine, e.t.c. Infographics are graphical illustration of information fast and clear-cut using comics, videos, charts, bars, maps or diagrams. It can also be said to be devices that transmit information through illustrations. In the same vein infographics are data visualization or information construction which aim is to make understanding of complex information, data and ideas faster, easier and simpler to the audience, Dick (2014)

In media system, the use of infographics as an instructional strategy has different dimensions of knowledge that can be transferred by explaining, concepts, processes and events, and also establishing connections between concepts and making abstract notions concrete. Media system is one of the courses in which using infographics to teach can effectively and widely be employed. With the visualization of information, concrete visual presentations are prepared, spatial topics and problems are visualized, learners' skills to process information are also exposed, Matrix & Hodson (2014). Infographics also involves animation, sound or video and can be prepared by either the students or teachers.

Guidelines for designing infographics

Schrock (2014) listed guidelines for designing infographics;

1. Set an aim
2. Determine the topic
3. Make it simple and understandable
4. Visuals, videos, sounds, animations or information should and must be attracting
5. References must be reliable
6. It must be appropriate for the students' level
7. Its inscription, figure, graphic and illustrations are to be integrated.

Thus, infographics as an instructional strategy synthesize information and visualization, and as well encourage multi-dimensional and critical thinking that can and should be used in Media system.

Statement of problem

This study ascertained to find out if infographics used as instructional strategy in media system has significant difference in academic achievement and effect on attitudes of pre-service teachers.

Purpose of the study

1. Ascertain the attitude of pre-service teachers towards the use of infographics in learning media system.
2. Determine the effect of infographics on pre-service teachers' academic achievement.

Research question

1. What is the attitude of pre-service teachers towards the use of infographics in learning media system?
2. What is the effect of infographics on pre-service teachers' academic achievement on media system?

Significance of the study

The study will be of a great importance to the teachers because of its immeasurable benefit. The infographics will awaken their consciousness for integration of infographics in professional practices, it will also make a new contribution to instructional strategies that can be used in classrooms for teaching and learning. Secondly, students will be proficient in the use of infographics. More so, the study is developed for further research and educational purposes.

Research design

The design used for the study was a quasi-experimental study and Solomon Four Group Design that are used to reveal differentiation in students' achievement and attitude. There are four groups formed through impartial assignment which are experimental group and two of them are the control group. Although measurements are made in all of the groups after the experimental process, pre-experimental measurements are made only in two groups, one being the experimental group and the other being the control group. The research design used in the study can be symbolized as in the following table:

Table 1: Solomon four group design

Groups	Impartiality	Pre-test	Experimental Treatment	Post-test
Group 1	R	O1	X	O2
Group 2	R	O3		O4
Group 3	R		X	O5
Group 4	R			O6

Group 1 and 3: The Experimental group I and the Experimental group II and **Group 2 and 4** are the Control group I and Control group II. **O1 and O3** were Pre-test that was administered

while **O2, O4, O5, and O6** comprised the post-test administered. **X** shows the experimental treatment while **R** the random assigning.

Population

The population was composed of 113 pre-service teachers of randomly assigned to the experimental and control group from four different options in the department of Curriculum Studies and Educational Technology in faculty of Education, University of Port Harcourt of 2016/2017 academic year. The study group has been formed as follows:

Table 2: Distribution table

Options	Groups assigned	f
Chemistry, Biology and Physics	Group 1 (Experimental)	26
	Group 2 (Control)	28
Computer Science and Mathematics	Group 3 (Experimental)	30
	Group 4 (Control)	29
TOTAL		113

Sample and sample size

The sample size consisted the entire population of one hundred and thirteen (113) third (3rd) year students in the Department of Curriculum Studies and Educational Technology, Faculty of Education, University of Port Harcourt, who are offering the course Media system 2017/2018 session. Purposive sampling technique was used.

Instrument and administration

An Achievement Test and a questionnaire developed by the researcher to measure students' knowledge and Attitude Scale for Media System were used for data collection. Validity and Reliability of the 30 items achievement test developed by the researcher to cover the achievements related to Instructional Media and Instructional Design Models as a topic. The test was administered to 30 pre-service teachers of four hundred (400) level who had already studied the topics. The data obtained in the pilot have been analysed using ITEMAN3.0 (Item and Test Analysis) software. As a result of statistical analysis, item difficulty indexes, item discrimination indexes, test mean, standard deviation and reliability coefficient (KR-20) were calculated. The KR-20 coefficient was found to be .78. The difficulty index of each item and discriminative index were also analysed differently. Face and content validity was used by the researcher. The Cronbach's alpha reliability coefficient of the 82 items attitude instrument was 0.92, test-retest reliability coefficient was found to be 0.88. Cronbach's alpha values were calculated to determine the reliability of "Attitude Scale for media system". The Cronbach's alpha value of the attitude was determined as .77.

Data Analysis

SPSS 22.0 (Statistical Package for the Social Sciences) and ITEMAN 3.0 (Item and Test Analysis) analysis software were used to analyse data. Dependent samples t-test, independent samples t-test and one-way variance analysis (ANOVA) were performed to determine whether there were statistically significant differences between the scores of the students in the

experimental groups and the control groups. These analyses have been applied both to the achievement test and attitude scale. $p < .05$ was used as Significance level

RESULTS AND DISCUSSIONS

Results Related to Pre-Test Scores of the Experimental Groups and Control Group

Table 3: Means and standard deviation of the pre-test of pre-service teachers in the experimental and control group on the achievement test:

	Groups	N	Mean	Ss
Experimental	Experimental I	26	42.92	11.28
	Experimental II	30	-	-
Control	Control I	28	43.92	11.62
	Control II	29	-	-
Total		113	43.44	11.36

From table 3, there is no significant difference in the mean scores of the pre-test achievement scores of the experimental group I (Mean = 42.92) and the control group I (Mean = 43.92).

Table 4: Achievement Test for Pre-Test of the Experimental Group I and the Control Group I

Group	N	Mean	Ss	sd	t	P
Experimental I	26	42.92	11.28	52	-.322	.749
Control I	28	43.92	11.62	52	-.322	.749

($p < .05$)

There is no significant difference between pre-test scores of the students [$t(52) = -.322$; $p > .05$].

Table 5: Post-Test of pre-service teachers in the Experimental and the Control Groups

Group	N	Mean	Ss	sd	t	P
Experimental	56	73.57	13.88	114	5.019	.001
Control	57	64.31	15.57	114	5.019	.001

($p < .05$)

The mean score of the post-test of pre-service teachers in the experimental groups is Mean = 73.57, the mean scores of post-test of pre-service teachers in the control groups is Mean = 64.31). The difference in post-test scores of the experimental group is (9.26). Therefore, the difference is statistically significant [$t(114) = 5.019$; $p < .05$] in terms of the experimental group.

Table 6: Achievement Post-Test Scores of the Students in the Experimental and Control Groups

		Group	N	Mean	Ss
Post test	Experimental	Experimental I	26	73.84	11.76
		Experimental II	30	73.33	13.95
	Control	Control I	28	64.14	14.74
		Control II	29	64.51	12.53
	Total		113	67.90	14.04

There is a difference between the mean scores of the post-test achievement scores of the experimental group I (Mean = 73.84) and experimental group II (Mean = 73.33) and the Control group I (Mean = 64.14) and the Control group II (Mean = 64.51).

Table 7: Independent samples t-test on the post-test scores of pre-service teachers in the experimental groups and the control groups.

Group	N	Mean	Ss	sd	t	P
Experimental	56	73.57	13.88	114	4.019	.001
Control	57	64.31	15.57	114	4.019	.001

($p < .05$)

Table 7 shows that there is a difference between the post-test mean on the achievement test in favour of the pre-service teachers in the experimental group (9.26), this difference is statistically significant [$t(114) = 4.019$; $p < .05$] in favour of the experimental group.

Table 8: One Way Variance Analysis (ANOVA) results of the post-test pre-service teachers in the experimental groups and the control groups on the achievement test

Source of Variance	Sum of Squares	Degree of Freedom	Mean of Squares	f	p	Sig.
Between Groups	2461.2	3	820.4	5.391		a-d
Within Groups	16586.7	109	152.1	5.391	.002	c-d
Total	19047.9	112				

a: Experimental I, b: Control I, c: Experimental II, d: Control II

The result of table 8 shows that there is statistically significant difference between the scores of pre-service teachers in the experimental groups and control [$F(3-109) = 5.391$; $p < .05$]. This finding shows that the use of infographics as an instructional strategy has a positive influence on pre-service teachers' academic achievement.

Table 9: Dependent sample t-test results of pre-test and post-test of pre-service teachers in the experimental group I

Group		N	Mean	Ss	sd	t	P
Experimental I	Pre-test	26	42.9	11.2	32	-20.28	.001
	Post-test	26	74.8	10.7	32	-20.28	.001

($p < .05$)

In Table 9, it is seen that there is significant difference between the pre-test (Mean=42.9) and post-test (Mean=74.8) of pre-service teachers in the experimental group on the achievement test. There was also statistically significant difference [$t(32) = 20.28$; $p < .05$].

Table 10: Dependent samples t-test results for the pre-test and post-test pre-service teachers in the control group I

Group		N	Mean	Ss	sd	t	P
Control I	Pre-test	28	43.9	11.6	21	-20.28	.001
	Post-test	28	64.1	14.7	21	-20.28	.001

$p < .05$

In Table 10, it is seen that there is a significant difference between the pre-test (Mean = 43.9) and post-test (Mean = 64.1) of pre-service teachers in the control group I. There was a statistical difference [$t(21) = -20.28$; $p < .05$] on the test scores.

Table 11: Mean and standard deviation scores of the pre-test of pre-service teachers' in the experimental group and the control group on the attitude level

Group		N	Mean	Ss
Experimental	Experimental I	26	3.09	0.245
	Experimental II	30		
Control	Control I	28	3.05	0.208
	Control II	29		
Total		113	3.07	0.225

It is seen in table 11 that there is no significant difference between the mean scores of the pre-test of pre-service teachers' in the experimental group I (Mean = 3.09) and that of control group I (Mean = 3.05) on the attitude level.

Table 12: The independent samples t-test analysis results related to pre-test scores of the experimental group I and the control group I on the attitude of pre-service teachers

Group	N	Mean	Ss	sd	t	P
Experimental I	26	3.09	.24	52	.689	.494
Control II	28	3.05	.20	52	.689	.494

($p < .05$)

The result of table 12 was seen that there is no statistically significant difference between the pre-test on attitude scores of the experimental group I and the control group I [$t(52) = .689$; $p > .05$]. Therefore, attitude level of the both groups before the treatment is the same.

Table 13: T-test analysis results of the post-treatment attitude scores of the experimental and the control groups

Group	N	Mean	Ss	sd	t	P
Experimental	56	2.96	.41	114	8.202	0.001
Control	57	2.25	.50	114	8.202	0.001

($p < .05$)

Table 13 shows that there is a statistically significant difference between the experimental and the control group [$t(114) = 8.202$; $p < .05$]. This difference is in favour of the experimental

group. Therefore, the use of infographics as instructional strategy can be effective in enhancing pre-service teachers' attitudes towards media system.

Table 14: One Way Variance Analysis (ANOVA) results with regard to the post treatment scores of the experimental and the control group on pre-service teachers' attitude

Source of Variance	Sum of Squares	Degree of Freedom	Mean of Squares	f	p	Sig.
Between Groups	14.2	1	14.2	67.27	.002	a-b
Within Groups	23.4	114	.212	67.27	.002	a-d c-b
Total	37.7	116				c-d

a: Experimental I, **b:** Control I, **c:** Experimental II, **d:** Control II

Table 14 shows that there is significant difference between the post-treatment attitude scores of the students in the experimental and the control groups [$f(1-114) = 67,27$; $p < .05$].

The result has shown that there is a significant difference between the mean score of post-test of the students in the experimental group I and the experimental group II who used infographics and that of the students in the Control group I and the Control group II in favour of the experimental group I and the experimental group II. The findings indicate that using infographics help developing positive attitudes towards the media system.

Table 15: Dependent samples t-test results of the pre-test and post-test scores of the students in the experimental group I

Group		N	X	Ss	sd	t	P
Experimental I	Pre-test	26	62.6	3.77	25	-5.753	.001
	Post-test	26	72.6	5.95	25	-5.753	.001

($p < .05$)

Table 15 shows that there is a difference between the pre-test ($X = 62.6$) and post-test ($X = 72,6$) scores of pre-service teachers' attitude in the experimental group I. The statistical difference, significant difference was seen to be [$t(25) = -5,753$; $p < .05$] level.

Table 16: Dependent samples t-test results of the pre-test and post-test scores of the students in the control group I

Group		N	X	Ss	sd	t	P
Control I	Pre-test	28	74.0	5.98	32	10.14	.001
	Post-test	28	64.8	3.83	32	10.14	.001

($p < .05$)

Table 16 shows that there is a negative difference between the pre-test ($X = 74.9$) and post-test ($X = 64.8$) scores of pre-service teacher's attitude in the control group I. The statistical difference, significant difference was calculated to be [$t(32) = -20,28$; $p < .05$] level.

CONCLUSION

According to the results in using infographics as instructional strategy in media system of three hundred (300) level students, there was no significant difference between the experimental groups I and the Control groups. The analysis also shows that there was a significant difference between the post-test of the groups in favour of the experimental groups. His result shows that infographics increase students' academic achievement in media system.

Hence, infographics are prominent strategies that can be used in classrooms. When infographics was used in three (300) hundred level students that offer media system class, there was no significant difference between the scores of their attitudes towards media system in the experimental I and control I groups in the pre-test, there was a significant difference between the post-test attitude of the groups in favour of the experimental group I and the experimental group II. These findings indicate that using infographics improves the attitudes of the students towards media system.

RECOMMENDATION

Infographics can be effectively and widely used in every level of because they are substantial resources that every teacher use to implement instruction and facilitate students' achievement of instructional objectives. It is also recommended that infographics should be used where academic achievement and attitudes of students in towards learning is low. Further studies to increase the use of infographics as instructional strategy in various courses especially media system or related should be carried out.

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