Comparison of Two Digital Packages for Online Economics Instruction in Secondary Schools in Nsukka Local Government Area

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Abstract

The study compared two digital packages - Digital Concept Maps Package (DCMP) and Digital Textual Notes Package (DTNP) for online Economics instruction in secondary schools in Nsukka LGA. Specifically, the study determined: effects of DCMP and DTNP on students' mean achievement scores in Economics; influence of gender on students' mean achievement scores; and interaction effect of packages and gender on students' mean achievement scores. It was a quasi experimental pretest-posttest study. Population comprised of 986 senior secondary school (SS) 2 Economics students. The sample size was 176 SS2 Economics students purposively drawn from the 19 coeducational schools in Nsukka LGA. Instrument for data collection was Economics Achievement Test (EAT). It was face validated by seven experts. EAT has internal consistency reliability index of 0.72 using Kuder-Richardson and temporal stability reliability index of 0.87 using Pearson Product. Two experimental groups were exposed to DCMP and DTNP, respectively. Mean, standard deviation and ANCOVA at 0.05 level of significance were used data analysis. The findings revealed that both DCMP (pretest $\overline{X}$=25.09; posttest $\overline{X}$=41.78) and DTNP (pretest $\overline{X}$=25.73; posttest $\overline{X}$=40.76) enhanced students' achievement in Economics. Gender (F = 0.002; p = 0.963) and interaction effect of packages and gender (F = 0.242; p = 0.624) were not significant in students' achievement in Economics. Based on the findings four recommendations were made.

Keywords: Digital, Packages, Concept, Maps, Textual, Notes, Online, Economics, Instruction, Achievement, Gender.

Introduction

Economics is a social science subject that deals with the study of individual's and national welfare in the face of scarce resources. The focal attention of the study of Economics is the production, distribution, and consumption of goods and services for the most optimal level of benefit (Mohammed & Pitan, 2022).

Economics provides basic knowledge and skills that will enable students to better appreciate the nature of economic problems in any society and adequately prepare them for the challenges in the Nigerian economy. The objectives of Economics according to the Nigerian Educational Research and Development Council (NERDC) (2008) include enabling

students understand economic principles, develop the skills for rational economic decisions and become sensitized to participate actively in national advancement through entrepreneurship, capital market, among others. Economics is therefore, useful in modern day life for family survival as life itself is full of economic activities on daily basis.

The NERDC (2008) in the Economics curriculum stipulated that teachers should use collaborative, interactive and learner-oriented instructional strategies and listed concept mapping as one of the strategies for teaching Economics. However, Yusuf, et al (2020) revealed that the conventional method of lecture has been used in teaching Economics in Nigerian secondary schools over the years and has led to students' average academic performance in the subject. Mohammed and Pitan (2022) observed that in the Nigeria educational system, this stereotypic lecture method without adequate explanation and application of relevant concepts leads to poor achievement because students are only expected to regurgitate what the teachers tell them.

Students' achievement in Economics, therefore, seems not to be encouraging despite the importance of the subject in preparing students for a better economic life. The West African Examination Council's Chief Examiner report in 2019 revealed a significant drop in candidates' performance when compared to those of the previous year. In 2023, the report showed that quite a good number of candidates showed great deficiency in the interpretations of mathematical and graphical analyses and representations to economic analysis leading to poor performance in questions where such

ability were required. Mode of instructional delivery (lecture method) has been attributed to be the cause of the poor students' achievement in Economics (Oyetoro, et al, 2019; Nnatuanya & Nwakwesiri, 2020; Mohammed & Pitan, 2022).

Secondary schools in Nsukka LGA are also not exempted from this situation. The Economics teachers in this area largely use lecture method to teach Economics leading to poor achievement in the subject. This study therefore, focuses on online instructional delivery in the form of instructional packages. This serves as an alternative mode of delivery to the conventional lecture method that has been reported to promote rote learning leading to students' shallow understanding and poor achievement subsequently (Yusuf, et al, 2020).

Online instructional delivery or package deals with students' learning through internet or web-based materials where educational resources are made available for students through the internet or online. In online instructional delivery, students are provided with website(s) they need to visit to get a given task done. Literature provides results in favour of usefulness, effectiveness, and positive influence of online instructional delivery or package on student's performance (Coman, et al, 2020; Oltean, 2021; Faloye & Obateru, 2021; Esege, et al (2022).

With the effectiveness of online instructional delivery proven, the current study therefore compared two digital packages for online Economics instruction. These are - Digital Concept Maps Package (DCMP) and Digital Textual Notes Package (DTNP). Digital Concept Maps Package (DCMP) is an online package for

Economics instruction for senior secondary school students. The online package can be accessed here: tooeducere.wordpress.com/economics-instructional-packages/ with the password – phdpackage. DCMP was developed by Chinyelugo (2024). The package is on five units of Economics curriculum bordering on mathematical and graphical analyses and representations to economics. The units include: utility, price mechanism, price legislation, elasticity of demand and elasticity of supply. Each of the five units has five components – objectives, readiness activity, map, study questions and multiple-choice questions.

On the other hand, Digital Textual Notes Package (DTNP) is in normal text form. DTNP and DCMP are practically same except that DCMP is mapped in graphical/visual form as concept maps while DTNP is written in prose form like a text note using Microsoft Word processor. All the four components (objectives, readiness activity, study questions and multiple-choice questions) in DCMP are also same in DTNP except for the map component which is in a simple textual format for DTNP. DTNP is also on all the five topics of interest in this study. The DTNP can be accessed here: tooeducere.wordpress.com/economics-textual-notes/ with the password econspackage. The DTNP was developed by the current researchers for the purpose of this study. In the two online instructional packages in this study, the teacher provides the students with the web addresses for the packages and instructs them to study them. The students visit the websites and study the packages. The packages are self instructional packages

and well suited for mathematical and graphical analyses in Economics curriculum.

This study also investigated influence of gender on achievement in Economics. Some researchers have indicated that male students are stereotyped into science inclined subjects and females into arts subjects (Ezechi & Adukwu, 2018). Economics is a social science subject that has both mathematical and theoretical analyses and contents. Therefore, investigating influence of gender on achievement in Economics is imperative. Researchers have reported varying findings in this regard. Some findings are in favour of males (Amuda, et al, 2016). Some are in favour of females (Aransi, 2018). Some other researchers reported no significant influence of gender on achievement in Economics (Eleje, et al, 2020; Atsumbe, et al, 2018; Ekweoba, 2014). Other researchers reported no significant influence of gender on online/computer usage and other computer related operations (Zubairu, et al, 2019; Ajanaku, et al, 2019; Akhigbe & Ogufere, 2020). These inconclusive reports on influence of gender on achievement in Economics, online/computer usage and operations underscored the need for this current study in online instructions with DCMP and DTNP.

Objectives of the Study
The general objective of the study was to compare effects of DCMP and DTNP in online Economics instruction in senior secondary schools Nsukka Local Government Area of Enugu State. Specifically, the study determined:
1. effects of DCMP and DTNP on students' mean achievement scores in Economics.

2. influence of gender on students' mean achievement scores in Economics.
3. interaction effect of packages and gender on students' mean achievement scores in Economics.

Hypotheses
Ho₁: There is no significant effect of DCMP and DTNP on students' mean achievement scores in Economics.
Ho₂: There is no significant influence of gender on students' mean achievement scores in Economics.
Ho₃: There is no significant interaction effect of packages and gender on students' mean achievement scores in Economics.

Methodology
Design of the Study: The design employed for this study was quasi experimental, pretest-posttest non-equivalent 2x2 factorial design. Intact classes were used for the study. The study had two experimental groups (experimental group one – DCMP and experimental group two DTNP). It had two independent variables with two levels each, namely – mode/package: DCMP and DTNP and gender: male and female.
Area of the Study: The study was conducted in Nsukka Local Government Area of Enugu State, Nigeria. Nsukka has 32 public secondary schools. There are 19 coeducational schools and 13 single schools. Some of the schools have computers and electricity (mainly through power generators).
Population of the Study: The population of the study was made up of 986 Senior Secondary (SS2) Economics students from the 32 public secondary schools in Nsukka Local Government Area (Post Primary School Management Board (PPSMB), Nsukka, 2023/2024 Session). The choice of SS2 students was informed by the fact that the class was not an examination class. The students in this class already have rudimentary knowledge of Economics from their previous SS1 class. Furthermore, the topics chosen for this study were all under SS2 class.

Sample for the Study: The sample size for the study was 176 SS2 Economics students. Purposive sampling technique was used to draw all the 19 coeducational schools from the 32 schools in the LGA because gender was a variable in the study. Then simple random sampling technique was used to draw four schools from the 19 coeducational schools. All the Economics students from the four sampled schools in their intact classes were used for the study. Male students were 84 while female students were 92.

Instrument for Data Collection: The instrument for data collection was Economics Achievement Test (EAT). The EAT is a multiple choice type of achievement test of 50 items with four options lettered A-D each and scored 1 point each. EAT and the packages were face validated by seven University lecturers in Economics Education (three), Measurement and Evaluation (one), educational technologists (two) and software/multimedia development (one). There was also content validation for the EAT using a table of specification. The internal consistency of the EAT was determined using Kuder Richardson and the reliability index was 0.72. Test-retest method was also adopted for EAT to check the temporal stability since it was used as a pretest and posttest. Using Pearson Product, correlation coefficient of 0.87 was

obtained. The high indices indicated that the EAT was reliable for the study.

Method of Data Collection: The SS2 students were taught with the DCMP and DTNP. Students in the four schools were randomly assigned to DCMP and DTNP groups with two schools making up for one group. The schools' regular Economics teachers were trained on the use of DCMP and DTNP for the groups, respectively. The teachers then guided and instructed the students in the online instruction with DCMP and DTNP. Period of instruction lasted for four weeks. Since the instruction was online, students had time both within the Economics school period in the timetable and outside school to attend to the online instruction. During the Economics periods in the schools' timetable, students were taken to their respective computer rooms. The researcher provided the bandwidth for internet connectivity for the online sessions. The links to the packages were also provided to the students to study with their personal phones/computers or in cyber cafes if privileged at their expense. The time limitation encountered if it were just physical contact was broken. So the DCMP and DTNP could be studied anywhere, anytime. Before the commencement of the instructional exercise, a pretest was administered using EAT to the two groups. After the instructional exercise, EAT was adequately shuffled and administered as a posttest to the two groups.

Technique for Data Analysis: Mean scores and standard deviations were used to answer the research questions while hypotheses were tested at 0.05 level of significance using Analysis of Covariance (ANCOVA). ANCOVA was used to test non-equivalent nature of the intact classes in the study.

Results

Table 2: Effects of DCMP and DTNP on students' mean achievement scores in Economics

Group	N	Pretest		Posttest		Mean Gain
		Mean	SD	Mean	SD	
DCMP	81	25.09	3.67	41.78	3.31	**16.69**
DTNP	95	25.73	4.03	40.76	2.61	**15.03**

Table 1 shows that DCMP group had a pretest mean achievement score of 25.09 with SD of 3.67. DTNP group had a pretest mean achievement score of 25.73 (SD 4.03). It could be observed that the two groups were almost at the same level of achievement prior to the experiment. The posttest mean achievement score for DCMP group is 41.78 (SD 3.31), while that of the control group is 40.76 (SD 2.61). The low SDs indicated that the scores are at close range. The DCMP group had a mean gain of 16.69 while DTNP group had 15.03. This showed that both DCMP and DTNP enhanced students' achievement scores in Economics given the high and close mean gains. However, DCMP enhanced students' achievement scores in Economics more than DTNP.

Table 2: ANOVA on effects of DCMP and DTNP on students' mean achievement scores in Economics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	85.340	2	42.670	4.989	.008
Intercept	5734.348	1	5734.348	670.494	.000
Pretest	39.862	1	39.862	4.661	.032
Package	**52.450**	**1**	**52.450**	**6.133**	**.014**
Error	1479.569	173	8.552		
Total	300710.000	176			
Corrected Total	1564.909	175			

P<0.05 = Significant. df = Degree of freedom; F = F-ratio; Sig = Significant level

Table 2 shows the main effects of DCMP and DTNP on students' mean achievement scores in Economics as F(6.133) with probability value of 0.014. Since the probability value is less than 0.05 level of significance at which the hypothesis was tested, the null hypothesis is rejected. Therefore, there is a significant effect of DCMP and DTNP on students' mean achievement scores in Economics.

Table 3: Influence of gender on students' mean achievement scores in Economics

Gender	N	Pretest		Posttest		Mean Gain
		Mean	SD	Mean	SD	
Male	83	25.24	3.83	41.22	3.09	**15.98**
Female	93	25.60	3.92	41.24	2.91	**15.64**

The data on Table 3 showed that the male and female students had pretest mean achievement scores of 25.24 (SD 3.83) and 25.60 (SD 3.92) respectively. This showed that both genders were almost at the same level of achievement prior to the experiment. The posttest mean achievement score for male students is 41.22 (SD 3.09), while that of their female counterparts is 41.24 (SD 2.91). The low SDs indicated that the scores are at close range. The male students had a mean gain of 15.98 while female students had 15.64. This showed that both male and female students achieved almost equally in Economics given their mean gains that are very close. However, male students achieved slightly higher than their female counterparts.

Table 4: ANOVA on Influence of gender on students' mean achievement scores in Economics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	32.909	2	16.454	1.858	.159
Intercept	5830.486	1	5830.486	658.403	.000
Pretest	32.892	1	32.892	3.714	.056
Gender	**.019**	**1**	**.019**	**.002**	**.963**
Error	1532.000	173	8.855		
Total	300710.000	176			
Corrected Total	1564.909	175			

P>0.05 = Not Significant

Table 4 showed the main effect of gender on students' mean achievement scores in Economics as F(0.002) with probability value of 0.963. Since the probability value is greater than 0.05 level of significance at which the hypothesis was tested, the null hypothesis is upheld. Hence, there is no significant influence of gender on students' mean achievement scores in Economics.

Table 5: Interaction effect of packages and gender on students' mean achievement scores in Economics

| Package | Gender | N | Pre-test | | Post-test | | |
			Mean	SD	Mean	SD	Mean gain
DCMP	Male	39	24.95	3.72	41.64	3.75	16.69
	Female	42	25.21	3.67	41.90	2.89	16.69
DTNP	Male	44	25.50	3.96	40.84	3.34	15.34
	Female	51	25.92	4.12	40.69	2.85	14.77

Table 5 showed that the pretest scores of the male and female students in the two groups are all very close showing that both genders in the two groups were almost at par prior to the experiment. The posttest mean achievement scores of male students in DCMP and DTNP groups are 41.64 (SD 3.75) and 40.84 (SD3.34) and mean gains of 16.69 and 15.34 respectively, while those of their female counterparts are 41.90 (SD 2.89) and 40.69 (SD 2.85) and mean gains of 16.69 and 14.77 respectively. The low SDs indicated that the scores are at close range. The mean gains for male and female students in the DCMP group are same with that of male being slightly higher in the DTNP group. This showed there was no interaction effect between packages and gender on students' mean achievement scores in Economics.

Table 6: ANOVA on Interaction effect of packages and gender on students' mean achievement scores in Economics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	87.428[a]	4	21.857	2.530	.042
Intercept	5724.431	1	5724.431	662.531	.000
Pretest	39.979	1	39.979	4.627	.033
Package	51.185	1	51.185	5.924	.016
Gender	.006	1	.006	.001	.979
Package * Gender	**2.087**	**1**	**2.087**	**.242**	**.624**
Error	1477.481	171	8.640		
Total	300710.000	176			
Corrected Total	1564.909	175			

P>0.05 = Not Significant

Table 6 showed the interaction effect of packages and gender on students' mean achievement scores in Economics as F(0.242) with probability value of 0.624.

Since the probability value is greater than 0.05 level of significance at which the hypothesis was tested, the null hypothesis is upheld. Therefore, there is no significant interaction effect of packages and gender on students' mean achievement scores in Economics.

Discussion

The result showed that both DCMP and DTNP enhanced students' achievement in Economics. This indicates that both packages are effective for Economics instruction in secondary schools. This observation could be attributed to the fact that both packages are online, giving students the enthusiasm and boost they needed for their study since today's learners seem to be digitally-driven learners. This finding supported that of Faloye and Obateru (2021) who reported that utilizing virtual instructional tools is pedagogically efficient as they serve as a boost for learning outcomes. With the digital packages, students' digital needs were met. Accordingly, online delivery makes the digital learners get motivated more easily (Uygur, 2019) and provides the needs of the learners (Kutlu & Menzi, 2013). Asiksoy (2019), Coman, et al (2020) and Mashhadi, et al (2021) all reported positive effects/influence of online/computer based instructions in their respective studies.

The slight difference in the mean scores in favour of DCMP could be explained by the fact that DCMP is developed in schematic/graphic form as concept maps. Accordingly, Wang (2019) noted that concept map presents the complex knowledge structure with simple schemas/graphics and the connections between knowledge points, which

promote students' meaningful learning. This is because schemas enable viewers to take out information or knowledge within the least possible time and with less effort (Santos, et al, 2017).

Another result of this study is that gender is not a significant factor in students' achievement in Economics. This suggests that there are no inherent academic differences between male and female students other than the societal expectations imposed on them. This finding is in line with that of Eleje, et al (2020) and Ekweoba (2014) who reported that gender had no significant influence on students' achievement in Economics. Atsumbe, et al, (2018) and Zubairu, et al (2019) reported that gender had no significant effect/difference in students' achievement in their respective studies.

Finally, the result of the study showed that the interaction effect of packages and gender was statistically insignificant. This showed that both DCMP and DTNP are not gender bias. They can provide equal opportunity for male and female students in Economics. This result is in line with that of Chinyelugo and Nwoji (2017) whose findings revealed a no significant interaction effect of mode of instruction and achievement in Economics. Furthermore, Ajaja, (2013), Olatoye and Adekoya (2010) and Ezeudu (2009) reported a non-significant interaction effect between method of instruction and gender on students' achievement in their respective studies

Conclusion

The findings of the study hve shown that DCMP and DTNP for online Economics instruction have motivated the students and their achievement in Economics has

been enhanced. With the study of Economics students are better equipped and informed with the knowledge and skill for family living survival amid the mounting and threatening economic challenges. Enhanced achievement in Economics through DCMP and DTNP, therefore, entails enhanced positive family living survival. The two digital packages are also not gender sensitive for students' achievement in Economics and therefore can be effectively used across genders. So both males and females have same capacity for positive family living survival through enhanced achievement in Economics using DCMP and DTNP.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Teachers should employ both DCMP and DTNP in teaching Economics.
2. Teachers, school management and government agencies should develop other online packages in line with DCMP and DTNP in other areas/units of Economics and other subjects.
3. Curriculum planners and textbook writers should include the addresses for DCMP and DTNP in the Economics curriculum document and textbooks.
4. Teachers should not discriminate between boys and girls in their Economics instruction. They should provide equal opportunities for them.

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