

Full Length Research

# Effect of Knowledge Approach, Age and Gender on Achievement in Economics among Secondary School Students in Oyo Township, Nigeria

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## Abstract

This study examined the effect of declarative knowledge approach, age and gender on achievement in Economics among secondary school students in Oyo Township. Simple random sampling technique was used in selecting participants into experimental groups and 156 SS II students were selected from six secondary schools for the study. A pre-test, post-test control group quasi-experimental design, with 2X3X2 factorial designs was adopted. Participants were randomly assigned to treatments. Instrument used to collect data was Economics Achievement Test ( $r=0.94$ ). Data were analysed with ANCOVA. The main effects of chronological age and gender were not significant on students' achievement but treatment was statistically significant ( $F_{(1,144)}=1095.275$ ,  $p<0.05$ ,  $\eta^2=0.68$ ). The two-way and three-way interactions effects were not statistically significant. It was then recommended that teachers should use relevant methods that will enhance students' performance such as DKA.

**Keywords:** Chronological age, Gender, Declarative Knowledge Approach, Achievement, Economics

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## INTRODUCTION

In different academic quarters, efforts have been made to checkmate the menace of poor performance among students. Different variables have been explored that can enhance students' academic performance both in schools' and in public examinations. Students' age, or better described as chronological age, is one of this important construct for learning. The connection between students' age and academic attainment cannot be ruled out. Various research efforts have been made to estimate the degree of chronological ages' effects on students' performance in school subjects. It is generally assumed that academic success fully, strongly and positively relies on learners' age (Grissom, 2004). Abubakar & Oguguo (2011) are of the reported that age plays a considerable part with respect to education, like entry

age of students to a school. Hence age could be a predictor of academic success. Ali (2013), examined factors affecting academic achievement of students discovered that age had significant effect on academic performance of graduate students. John, Jackson & Simiyu (2015) further observed that chronological age of students played a significant role in academic performances on the teacher made tests. In another study, Abubakar & Adegboyega (2012) discovered a positive correlation between age and academic achievement in Mathematics among students of Colleges of Education. The study revealed a linear relationship between CGPA and age on academic achievement of students. On the meta-analysis note, findings have shown that older students do perform much better than younger ones academically (La Paro & Pianta, 2000; Stipek & Byler, 2001). On the contrary, Aransi (2018), Abubakar & Oguguo (2011), reports show that chronological age have no significant relationship with students' academic performance. To these reports, age is not a predictor of students' academic success.

While examining the relationship between gender and students' performance, Abubakar & Oguguo (2011) discovered a significant relationship between gender and academic performance among NCE students. Several reports on gender effect on students' performance upheld the null hypothesis which stated that the mean scores of male and female students' achievement is not significant (Dania, 2014; Adigun, Onihunwa, Irunokhai, Sada & Adesina (2015); Eze, Ezenwafor & Obidile, 2016). Nnamani & Oyibe (2016) further reveal that gender seemed to have differential effect on academic performance of female students.

However, several other studies have shown none significance relationship between chronological age of student and their academic performance. Eze, Ezenwafor, & Obi (2015) reported the main effects of gender and age on students' performance but find out that the interaction effects of age and gender on academic achievement of vocational and technical education (VTE) students of a Nigerian university were not statistically significant. This reveals that a linear relationship does not exist between the two-predictor variables in the study (age and gender) and academic achievement of the students and that their combined contribution was insignificant. The findings of Agboola (2006), Owolabi & Ekuk-Irien (2009), Zember & Blume (2011) revealed that age and gender had effects on academic achievement of students in Mathematics, science and ICT. Abubakar (2010) recorded a positive but insignificant correlation between age, gender and CGPA of Mathematics students.

Appropriate teaching methods can be a causal for high performance in educational endeavour. Many research efforts have been used to fast-track students' learning attainment. The use of knowledge approach such as declarative knowledge tends to lend a help in the academic attainment of students. That is why, Lauritzen (2012), Haapasalo & Kadujevich (2000) refer to DKA as a pedagogical or educational approach. It is an explicit understanding of the principles that govern a domain and of the interactions between pieces of knowledge in a domain. This study examined the effect of chronological age, gender and declarative knowledge approach on students' academic achievement among secondary students in Economics in Oyo Township.

Seven hypotheses were tested at the 0.05 level of significance.

- Ho1:** The main effect of chronological age is not significant on Economics students' achievement.
- Ho2:** The main effect of gender is not significant on Economics students' achievement.
- Ho3:** The main effect of treatment is not significant on Economics students' achievement.
- Ho4:** The effect of chronological age and gender is not significant on Economics students' achievement.
- Ho5:** The effect of chronological age and treatment is not significant on Economics students' achievement.
- Ho6:** The effect of gender and treatment is not significant on Economics students' achievement.
- Ho7:** The effect of chronological age, gender and treatment is not significant on Economics students' achievement.

## METHODOLOGY

A quasi-experimental design was used to establish the effect of independent variable and moderating variables on the dependent variable. Senior Secondary School Two (SS2) students offering Economics in public secondary schools were the targeted population in Oyo Township, Oyo State. Six schools were randomly selected for the study while a total number of 156 students participated in the study.

Economics Achievement Test (EAT) was used as an instrument. Economics Achievement Test (EAT) questions were culled from the West African Examination Council (WAEC) past questions series for both pre-test and post-test covering taxation and the concept of cost and revenue. Participants were examining with 30 objectives questions and each item consists of four options A to D. The reliability consistency of the test was determined at 0.94 with K-R 20. Data collected were analysed using Analysis of Covariance.

## RESULTS

**Hypothesis 1:** The main effect of chronological age is not significant on Economics students' achievement.

**Table 1:** Summary of Analysis of Covariance of Students' Age, Gender and Treatment on Achievement in Economics

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	9459.47a	11	859.95	133.72	0.00	0.91
Intercept	1390.03	1	1390.03	216.14	0.00	0.60
Pre-Achievement	28.86	1	28.86	4.49	0.04	0.03
Age bracket	4.99	2	2.50	0.39	0.68	0.01
Gender	0.80	1	0.80	0.12	0.73	0.00
Treatment	2006.26	1	2006.26	311.96	0.00	0.68
Age bracket *Gender	5.48	2	2.74	0.43	0.65	0.01
Age bracket *Treatment	18.42	2	9.21	1.43	0.24	0.02
Gender* Treatment	0.36	1	0.36	0.06	0.81	0.00
Age bracket * Gender*Treatment	0.16	1	0.16	0.02	0.88	0.00
Error	926.09	144	6.43			
Total	32491	156				
Corrected Total	10385.56	155				

*a R Squared = .91 (Adjusted R Squared = .90)*

**Hypothesis 1:** The effect of chronological age has no main significance on Economics students' achievement.

Table 1 shows the summary of Analysis of Covariance (ANCOVA) of students' post-test achievement scores in Economics by chronological age, gender and treatment. The result revealed that the effect of chronological age on students' achievement in Economics was statistically not significant ( $F_{(2,144)} = 0.39$ ,  $p > 0.05$ ); therefore the null hypothesis was sustained. Further, the Partial Eta Square ( $\eta^2$ ) = 0.01 was obtained. The implication of this is that the age bracket accounted for 0.5% variance observed in students' achievement in Economics is 1%. Adjusted mean score was carried out to determine the age bracket that accounted momentous difference among the categories. The result is presented in Table 2.

**Table 2:** Adjusted Mean Score of Age Bracket

Age Bracket of the Respondent	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Below 15years	13.88a	0.76	12.37	15.39
16-18 years	13.22a	0.24	12.74	13.69
19-21 years	11.06a,b	1.15	8.79	13.33

*a Covariates appearing in the model are evaluated at the following values: Pre-Achievement score = 8.49.*

*b Based on modified population marginal mean.*

Table 2 shows that age bracket of below 15 years old had the highest adjusted mean score of 13.88 followed by 16-18 years with 13.22 mean score while age 19-21 years had the lowest mean score of 11.06.

**Hypothesis 2:** The main effect of gender is not significant on Economics students' achievement.

In Table 1, the analysis shows that there is no significant main effect of gender ( $F_{(1,144)} = 0.124$ ,  $p > 0.05$ ) on students' achievement in Economics. The null hypothesis is upheld. The implication of this is that gender accounted for 0.0% variance observed in students' achievement in Economics. This implies that gender has no effect students' achievement in Economics. The adjusted mean score was carried out on gender to determine which of the sex accounted for significant change. The result presented in Table 3.

**Table 3: Adjusted Mean Score of Gender on Students' Achievement in Economics**

Gender of respondents	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Male	13.67a	0.69	12.32	15.03
Female	11.90a,b	0.46	11.00	12.80

*a* Covariates appearing in the model are evaluated at the following values: Pre-Achievement score = 8.4872.

*b* Based on modified population marginal mean.

Table 3 reveals that male students had the highest adjusted mean score of 13.67 while female counterpart had 11.90 mean score. This means that male students performed better than female students did.

**Hypothesis 3:** The main effect of treatment is not significant on Economics students' achievement.

The result from Table 1 show that there is significant main effect of treatment ( $F_{(1,144)} = 311.96$ ,  $p < 0.05$ ) on students' achievement in Economics. This invariable makes the null hypothesis to be rejected. Table 1 further showed that the Partial Eta Square ( $\eta^2$ ) = 0.68. The implication of this is that the treatment accounted for 68% variance observed in the students' achievement in Economics. This implies that treatment has sufficient effect on students' achievement in Economics. Sidak Post-hoc analysis was carried out in Table 4 to determine which of the treatment has the significant effect on students' achievement. The adjusted mean score was also explored to locate the direction of significant effect of treatment in Table 5.

**Table 4: Sidak Post-hoc Analysis Treatment**

Groups	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Declarative group	21.98a,b	0.77	20.47	23.50
Control group	5.27a	0.46	4.36	6.18

*a* Covariates appearing in the model are evaluated at the following values: Pre-Achievement score = 8.49.

*b* Based on modified population marginal mean.

Table 4 shows that learners in Declarative group had the highest mean score of ( $X = 21.98$ ) while those in control group had the least mean score of ( $X = 5.27$ ). Table 5 below reveals that the difference between declarative and control groups was statistically significant.

**Table 5:** Estimated Marginal Means for Treatment

(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig. <sup>d</sup>	95% Confidence Interval for Difference <sup>d</sup>	
					Lower Bound	Upper Bound
Declarative group	Control group	16.71*,b	0.90	0	14.94	18.48
Control group	Declarative group	-16.71*,c	0.90	0	-18.48	-14.94

*Based on estimated marginal means*

*d Adjustment for multiple comparisons: Sidak.*

The result from the post-hoc analysis in Table 5 reveals that the mean score in Students' Achievement was because of Declarative group. The result implies that Declarative group was different.

**Hypothesis 4:** The effect of chronological age and gender is not significant on Economics students' achievement.

From Table 1, the findings show that there is no significant interaction effect of chronological age and gender ( $F_{(2,144)} = 0.43$ ,  $p > 0.05$ ) on students' achievement in Economics. The null hypothesis was upheld. The Partial Eta Square ( $\eta^2$ ) was obtained at 0.01. The implication of this is that the chronological age and gender accounted for 0.06% variance observed in students' achievement in Economics. This implies that student' age and gender has no significant effect on students' achievement in Economics. The adjusted mean score was carried out on age and gender to determine the direction of significance and the result is presented in Table 6.

**Table 6:** Estimated Marginal Means for Age and Gender

Gender of respondents	Age bracket of the respondent	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Male	Below 15 years	13.90a	1.39	11.16	16.65
	16-18 years	13.00a	0.38	12.24	13.75
	19-21 years	14.12a	1.47	11.22	17.01
Female	Below 15 years	13.85a	0.63	12.59	15.10
	16-18 years	13.44a	0.29	12.87	14.01
	19-21 years	4.94a,b	1.81	1.37	8.51

*Pre-Achievement score = 8.49.*

Table 6 revealed that male students had the highest adjusted mean score in the categories of 19-21 years (14.12) and female students had the highest mean score among below 15 years (13.85) while the female students had the lowest adjusted mean score in the categories of 19-21 years (4.94) and male students only among 16-18 years (13.00).

**Hypothesis 5:** The effect of chronological age and treatment is not significant on Economics students' achievement.

From Table 1, the findings show that there is no significant interaction effect of chronological age and treatment ( $F_{(2,144)} = 1.43$ ,  $p > 0.05$ ) on students' achievement in Economics. The null hypothesis was sustained. The Partial Eta Square ( $\eta^2$ ) was valued at 0.02. The implication of this is that chronological age and treatment accounted for 2% variance observed in students' achievement in Economics. This implies that students' age and treatment had no significant effect on students' achievement in Economics. The adjusted mean score was carried out on age and treatment and the result is presented in Table 7.

**Table 7:** Estimated Marginal Means for Age and Treatment

Treatment	Gender of Respondents	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Declarative group	Male	21.92a	1.22	19.51	24.33
	Female	22.08a,b	0.56	20.96	23.19
Control group	Male	5.42a	0.65	4.13	6.71
	Female	5.12a	0.66	3.82	6.43

*a* Covariates appearing in the model are evaluated at the following values: Pre-Achievement score = 8.49.

*b* Based on modified population marginal mean.

Table 7 revealed that students in Declarative group had the highest adjusted mean score 22.08 while female in the control group had the lowest adjusted mean score of 5.12.

**Hypothesis 6:** The effect of gender and treatment is not significant on Economics students' achievement.

From Table 1, the findings show that there is no significant interaction effect of gender and treatment ( $F_{(1,144)} = 0.06$ ,  $p > 0.05$ ) on students' achievement in Economics. The null hypothesis was retained. The Partial Eta Square ( $\eta^2$ ) was valued at 0.00. The implication of this is that gender and treatment accounted for 0% variance observed in students' achievement in Economics. This implies that students' gender and treatment had no significant effect on students' achievement in Economics.

**Hypothesis 7:** The effect of chronological age, gender and treatment is not significant on Economics students' achievement.

The results in Table 1 revealed that there is no significant three-way interaction effect of chronological age, gender and treatment ( $F_{(1,144)} = 0.02$ ,  $p > 0.05$ ) on students' achievement in Economics. The null hypothesis was upheld. The Partial Eta Square ( $\eta^2$ ) was valued at 0.00. The implication of this is that chronological age, gender and treatment accounted for 0% variance observed in students' achievement in Economics. This implies that students' chronological age, gender and treatment had no significant effect on students' achievement in Economics.

## DISCUSSION

The result showed that the main effects of chronological age and gender were not significant on Economics students' achievement. These findings are in conformity with Aransi (2018), Abubakar & Oguguo (2011), reports that chronological age have no significant relationship with students' academic performance but contradicts Abubakar & Adegboyega (2012) findings of a linear relationship between CGPA and age on academic achievement of students. This report further revealed that younger age students tend to perform much better than the older ones when the mean score is considered. This is at variance with the meta-analysis reports of La Paro & Pianta (2000); Stipek & Byler (2001) which found that older students do perform much better than younger ones academically. The finding corroborates Dania (2014), Adigun, Onihunwa, Irunokhai, Sada & Adesina (2015), Eze, Ezenwafor & Obidile (2016). However, this finding contravenes Abubakar & Oguguo (2011) which found gender more significant on academic performance among NCE students. The adjusted mean score reveals that male students performed much better than female students did. This upheld Nnamani & Oyibe (2016) conclusion that gender appeared to have effect on female students' performance. There was a significant main effect of treatment on Economics students' achievement. This finding is in line with Rittle-Johnson & Alibali (1999) which reported that treatment had main significant effect on Economics students' performance.

On the two-way analysis, the findings show that there is no significant interaction effect of chronological age and gender; chronological age and treatment; and gender and treatment on students' performances. This finding is in line with Eze, Ezenwafor, & Obi (2015) that discovered that the interaction effects of age and gender has no significant relevance with the academic achievement of vocational and technical education (VTE) students of a Nigerian university.

However, this negates Agboola (2006), Owolabi & Ekuk-Irien (2009); Zember & Blume (2011) reports that the interactions of age and gender have effects on academic achievement of students in Mathematics, Science and ICT. This result upheld the findings of Adekoya & Olatoye (2011), Fatokun, & Omenesa (2015) who found no interaction effect between gender and treatment on science students' performance but contradict Dania (2014) findings that affirmed interaction effect of gender and treatment in Social Studies. Regarding interaction effect of chronological age and treatment, this reports discovered that there is no interaction effect on age and treatment. This implies that the combination of chronological age and treatment are not sufficient to engender high performance among Economics students.

The three-way analysis shows that the interaction effect of chronological age, gender and treatment was not significant on Economics students' achievement. This result supports the findings of Abubakar (2010). This implies that the combined effect of the three variables cannot stimulate high performance among Economics students in Secondary schools.

## CONCLUSION

The conclusion of this study is that irrespective of treatment employed, age and gender may not influence students' achievement, but the treatment such as Declarative Knowledge Approach will spark high performance among students of Economics. This finding shows that when right approach is in use, a corresponding high performance is attainable.

## RECOMMENDATIONS

Based on the findings of this study, it is recommended that teachers should use relevant methods that will enhance students' performance such as declarative knowledge approach. Finally, researchers can compare the effects of chronological and maturational age on learners' performance in school's or vocational subjects.

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