

THE TEACHERS' PERCEPTION OF THE USE OF TECHNOLOGY IN TEACHING AND SUPPORTING EARLY CHILDHOOD LEARNERS: A CASE STUDY OF SELECTED PRIMARY SCHOOLS IN LAGOS STATE, NIGERIA

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Abstract

The 21st century regards technological skills as crucial for development and stimulating learning, particularly for young learners in the formation stages. However, resource disparity between developed and developing countries compromises the quality of technology-aligned benefits and perpetuates existing inequalities experienced in different contexts. Teachers' dearth of technological skills and knowledge also contributes to the limited use. This study explored teachers' perceptions of the use of technology in teaching early childhood learners from selected primary schools in the Agege Local Government area of Lagos State, Nigeria. The study hypothesised that the psychological perceptions of the teachers concerning technology are likely to impact their teaching mode for early childhood learners. The researchers administered 100 questionnaires to gather data from the respondents and performed Cronbach's alpha reliability test to validate the originality of the study results. Furthermore, the study used the structural equation model techniques in the analysis to enhance reliability and validity. The results showed a positive but not significant relationship between the teachers' perceptions and the use of ICT. The study suggests that the government provide in-service and continuous training for primary school teachers regarding ICT skills, which will benefit young learners. The government should also provide age-appropriate resources to enhance teachers' productivity in introducing technology for young learners.

Keywords: Teachers, Perception, Technology/ICT, Teaching, Primary school

1. Introduction

In this era, technology has taken over the majority of fields, including education. Information technology (ICT) has become a mastery move in almost every country. ICT now significantly impacts how people think, live, and work because of its ability to change our society (National Academies of Sciences, 2017). Educational institutions and schools are essential parts of the paradigm shift to prepare learners to dwell in a culture that regards ICT as a part of the curriculum (Almazroui, 2023). One of the educational sector's challenges is less skill of teachers with technological knowledge, encompassing information and communication technology (Nyakito et al., 2021; ElSary, 2024). Despite the systematic growth in the ICT sector (Avgerou et al., 2016),

studies have revealed adverse effects on teachers' classroom delivery in underdeveloped countries (Comi et al., 2017; Bai et al., 2021).

Notwithstanding, ICT has been a significant source of improvement in the knowledge of teachers and learners (Haleem et al., 2022). ICT has relieved teachers of their chalk-and-talk teaching mode, provided necessary activities, saved time, and pushed teacher-learner cordial relationships (Haleem et al., 2022). However, despite the contribution of ICT to simplify teaching for teachers and the National Policy on Education (Varghese et al., 2025) to enhance the teacher capacity with technology, little was known about the perception of teachers to the use of technology in the Lagos State of Nigeria, especially in the Agege Local Government of Lagos State. Lagos State is one of the most commercial centres in Nigeria, with the highest population in the Southwest region. However, poor ICT knowledge (Adeleke et al., 2015) is among the challenges teachers face in Lagos State (Ogwazu & Ayannuga, 2024). Getting the best from teachers to improve the learners' academic performance has been a challenge in the Agege local government of Lagos State.

It is necessary to specifically explore the barriers challenging early childhood teachers in integrating ICT in teaching, to which researchers have given less attention (Karofi, 2025). The teachers' diverse perception of technology use includes poor enabling environments, inaccessibility to computers (Winter et al., 2021), fewer practices of the use of the computer (Aworanti, 2016), gender disparity in the use of computers, and phobia of computers, among others. The consequences are enormous for the advancement of the education sector. Teachers need relevant information and the capacity to use virtual ICT to access subject content knowledge and solve relevant classroom problems (Bariham et al., 2021). In other words, it may be challenging to include ICT in the classroom without teachers with technology knowledge and its usage to satisfy the instructional goals (Ofosu-Asare, 2024). Thus, a better comprehension of the purpose of ICT in reworking the teaching and learning surroundings is vital for advancing technology usage for instructional purposes (Waliu et al., 2025).

Helm, Katz and Wilson (2023) opine that learners' understanding of the subject matter is likely to be influenced by exposure to ICT and that the learners might have the opportunity to explore and discover many things with the aid and guidance of caregivers or teachers. Nevertheless, the process demands many differences in the education sector to contend with new challenges in ICT integration. The application of ICT in education in the general sense implies a technology-based (TB) teaching and learning procedure that is almost similar to the implementation of studying ICT in schools. Moreover, since learners are acquainted with ICT, they will grasp the skills better within the TB surroundings. Therefore, incorporating ICT in schools, particularly for teaching, is necessary. Furthermore, since the employment of ICT in education engenders several pedagogical aspects, the utilisation of ICT will advance to implicit studying with the aid and assistance of ICT elements and components (Siviy, 2023).

Evidence from developed countries has revealed that teachers' perceptions of the use of technology yielded notable positive outcomes (Abel, Tondeur & Sang, 2022). One of the positive outcomes includes a smooth and easy classroom content delivery for the

teacher and learner (Varier et al., 2017). Teachers in developed countries perceive technology use as a benefit to teaching and learning because it creates a smooth and easy environment for teaching and learning (Mehta, 2021). A study in the United Arab Emirates (UAE) on teachers' perceptions of using technology in teaching languages by Ismail et al. (2010) used the questionnaire and interview techniques to collect data and employed descriptive statistics and t-tests to analyse the questionnaire. The results of this study show that the teachers have a positive belief, and the integration of ICT enhances their competence. Silviyanti and Yusuf (2015) also investigated English as a Foreign Language (EFL) Teachers' Perceptions of using ICT in their Teaching. The study used a closed-ended questionnaire to interview 42 teachers. The descriptive method was used to analyse the data. The findings showed that most teachers embraced technology, and the results contributed to the body of knowledge. Furthermore, a descriptive study by Malakia and Cloneria (2018) on teachers' perceptions of using technology in teaching and learning found that the teachers positively believe in integrating ICT for teaching and learning. Additionally, Jannah et al. (2020) on elementary school teachers' perceptions of digital technology-based learning in the 21st century used similar studies for data analysis. The findings revealed that the teacher's competency in digital skills enhances successful classroom teaching, and the schools with digital technological tools perform better than others that lack the infrastructure.

Studies in Sub-Saharan African countries have reported on the perception of teachers on the use of technology (Adeyinka, Aina, & Ogegbo, 2023; Ogegbo & Aina, 2020; Murithi & Yoo, 2021). However, there is no general conclusion on teachers' perceptions of the use of technology. Ogegbo & Aina (2020) conducted a study on early childhood teachers' perceptions of the use of technology and used a semi-structured interview for analysis. The findings show that teachers embrace and have the right attitude towards ICT use. A study in Kenya also suggested that a competency-based curriculum be implemented using ICT (Murithi & Yoo, 2021). The study used descriptive statistics and ANOVA in analysing the primary collected data. The findings revealed that teachers have a negative perception of the use of technology due to insufficient technological tools in schools, which connotes a threat to the integration of ICT in the classroom (Murithi & Yoo, 2021).

Numerous studies have been carried out on the teacher's perception of the use of technology; however, the methodological contribution is mostly lacking. A related study on teachers' perception of the usefulness of ICT in Nigeria used descriptive and t-test statistics to analyse the data and emphasised that the unavailability of technological resources may not determine teachers' effectiveness in using ICT (Funke & Oluwafemi, 2019). Another study by Otemuyiwa et al. (2020) employed descriptive statistical techniques, and findings show that the teacher's perception of ICT was negative, affecting its usage in teaching. Furthermore, the study by Aminu & Samah (2019) used a descriptive survey method, and the results suggested that the awareness and training of the teachers on the use of ICT are likely to enhance classroom practices. However, from the literature search, there is a paucity of studies using the Structural Equation Model (SEM) in related studies. Nevertheless, this study makes a significant

contribution from a methodological perspective and employs the Structural Equation Model (SEM) to investigate teachers' perceptions of the use of technology in teaching. This study includes the concept of information and communication technology, stylised facts about the Lagos State Eko Excel digital project, research methodology, results and interpretation, conclusion and recommendations.

2. The Concept of Information and Communication Technology (ICT)

ICT can be employed differently in teaching and learning practices as it benefits both the teachers and learners to better understand their subject area. Using technology for instructional delivery offers many fascinating methods to make the study a satisfactory and fulfilling process (Haleem et al., 2022). These consist of instructional videos, data storage, word painting, inductive approach, rhyming, and the World Wide Web (www). In other words, there is a lot to gain in technology integration if learners are not confined to restricted and standardized curriculum and resources but rather have pro-active activities in a technology-based course set to assist and quicken their comprehension of the lesson. Also, ICT assists teachers in preparing their lesson notes, therefore creating productive, innovative and satisfying ways that could end in learners' eagerness to learn. Prior research has shown that ICT usage in teaching and learning will strengthen the learning exercise and improve the learner's potential in active studying (Kilag et al., 2023).

Studies have pointed out three major steps that would help the teacher to appraise and consider ICT: integration, enhancement and complementarity. The integration method is about applying the usage of ICT in the specific lesson area that involves related concepts and skills to better student fulfilment and achievement. Also, there is a need to review the curriculum to include only ICT-related materials and suitable software that will be instated into the curriculum for its aim and objectives to be attained. The enhancement approach is the use of ICT to place considerable emphasis on the introduced topic. For example, the use of PowerPoint in Microsoft Office can be applied to the presentation of a subject innovatively and productively which will advance to interaction and exchange of thoughts and ideas. Lastly, a complementary approach is to help and support the learners' learning with the utilization of ICT (Adner & Lieberman, 2021; Ogegbo & Aina, 2020). Learners are more structured and organized with the complementary approach as they can collect notes from the computer system, submit their work from home through the mail to meet the time limit and search for information from different sources online to fulfil their given task (Liu & Yu, 2023). The use of ICT in T&L can result in properly planned and good policy-making that will bring about numerous changes in the school (Pinheiro et al., 2023).

Stylized fact of ICT in Lagos state: Eko Excel Digital Project

In Nigeria, Lagos State is one of the largest and most popular cosmopolitan cities (Olukanni & Oresanya, 2018). The National Population Commission of Nigeria estimated the Lagos state population as 15,387,639 million as of 2022, with 20 Local governments, National Bureau of Statistics (2022) and Agege local government comprising 1.3 million residents (Anetor & Oyekan, 2018) with 50 primary schools and 500 teachers (Owoyemi et al., 2020). The Lagos State government, through the Ministry

of Education and the Lagos State Universal Basic Education Board (SUBEB), launched "The EKO Excel digital project" (Leung et al., 2022). The project aimed to make schooling attractive to all learners irrespective of their background, to properly develop their cognitive reasoning using technology. The intention was for no child to be left unattended, and their slogan is to "Leave No Child Behind" That is why the Eko Excel project formulated their technology to put every learner on the track for learning. Public school teachers with four years of experience and above were mandated to attend the training for two weeks.

Furthermore, the training aimed to guide the teachers on the appropriate use of technology for classroom instruction. The government distributed recorded teaching audio (MP3) for all learners, and the teachers were given a tablet (TAB). However, many learners could not use the device due to an insufficient power supply (Ukpong, 2020), and some also complained that the MP3 devices were not working correctly. Most teachers frowned at this suggestion because they felt it could make them ineffective in the classroom. Also, the training duration was too concise for the teachers who did not have the background knowledge of technology to grasp and achieve the set objectives set by the educational setup in Lagos State (Olajuwon et al., 2021). The device development should have improved the learners' knowledge and interest in studying; however, the devices had been structured for teachers to teach in the classroom, which implies that their knowledge/experience no longer counts. The Lagos State Ministry of Education designed the EKO Excel digital project policy without involving the teachers at the front line of learners' educational attainment a stakeholders in the policy.

Additionally, the Eko Excel project might have been an exceptional establishment to support learners/teacher instruction in Lagos State; however, the government failed to realize that the purpose of the project cannot be achieved without considering the opinion of the grassroots teachers/caregivers in the line. Instead, it was done by the top officials in the Ministry of Education, who gave specimens of what would be designed to the IT technicians to set up the training (Olajuwon et al., 2021).

The incorporation of ICT in education is the use of computer-based transmission that is integrated into everyday teaching exercises. In addition to helping learners in the present electronic age, teachers are perceived as the primary participants in using ICT in their simple instructions. This is because of the efficiency of ICT in contributing to a vital and motivated T&L environment (Siraj et al., 2023). While ICT incorporation aims to boost and enlarge the quality, availability and efficiency of instructional delivery to the learners, it is also said to be the profit from networking the school environment to confront global problems (Alenezi et al., 2023). ICT incorporation is not one step but a continuous process that fully supports the T&L and information resources (Liang et al., 2023).

3. Research method

The study used a structural equation model (SEM) to estimate the effect of teacher perception on the use of technology in teaching and learning. SEM was the appropriate statistical technique as the study involved multiple associations between the dependent

and the independent variables. Before the application of SEM, we applied ordinary least squares (OLS), and the model can be expressed as follows:

$$Technology = \alpha_i + \alpha_{i1}Percept + \varepsilon_{1i} \quad (1)$$

Where *Technology* is the use of technology in teaching and learning, *Percept* Note the perception of the teacher, α_i is constant or intercept, α_{i1} as the parameter of regression and ε_{1i} is the error term. There is no need to repeat this model because other objectives follow a similar pattern.

4. Data and Reliability Tests

A longitudinal design was used in the study, and five primary schools were used, along with twenty teachers each from these five schools selected in the Agege Local Government Area of Lagos State (ALGALS). The instrument used for data collection was the questionnaire. It was disseminated to the teachers who were randomly selected. A simple random sampling technique was used to draw 100 respondents from five primary schools out of the total number of schools in the Agege Local Government Area of Lagos State. Copies of the questionnaires were personally administered to respondents by the researcher. The completed questionnaire was retrieved the same week to avoid loss.

This study used primary data from the administered questionnaires completed by selected teachers in the Agege Local Government Area of Lagos State, Nigeria. This study encountered common problems in primary data collection, such as the reluctance of respondents, time consumption, and transportation costs, among others. However, the study employed Cronbach's alpha for the reliability test of the data collected from the respondents. The responses from the data collected were in categories with five Likert scales, such as strongly agreed, agreed, neutral, disagreed and strongly disagree. The study conducted a reliability test for the questions and excluded demographic responses. There is a greater consistency as the scale reliability coefficient was 0.7601, which seems to be close to 1 (see Table 1). The study dropped variables (or questions) where the values were in the reverse order with negative signs, as the response of such a variable may not likely be reasonable.

Table 1 Reliability Test using Cronbach's alpha

Item	Obs	Sign	item-test correlation	item-rest correlation	interitem correlation	alpha
A negative perception of early childhood teachers affects the use of technology in teaching and learning (recode as npece)	100	+	0.3829	0.2614	0.2084	0.7866
Does using technology in the classroom provide learners with independence and active learning (recode as utclass)	100	+	0.5931	0.4964	0.191	0.7677
Many teachers lack confidence and are hesitant to use technology (recode as mtlconf)	100	+	0.2065	0.0751	0.223	0.8007
The use of technology in teaching is a waste of time(recode as uttw)	100	-	0.5709	0.4708	0.1929	0.7699
Learners understand more easily what they learn with technology (recode as sueasily)	100	+	0.5948	0.4983	0.1909	0.7676
The use of technology is very essential in teaching (recode as tessent)	100	+	0.6218	0.5296	0.1886	0.765
Technology increases students' academic achievement (recode as tisaachi)	100	+	0.6714	0.5879	0.1845	0.7601
Technology enhances the interaction between teacher and learners (recode as teibts)	100	+	0.5913	0.4942	0.1912	0.7679
Technology gives teachers the opportunity to be learning facilitators instead of information providers (recode as ttolfiip)	100	+	0.4917	0.3811	0.1994	0.7771
ICT in early childhood offers opportunities for creative development with young children (recode as ictoppo)	100	+	0.6756	0.5929	0.1842	0.7597
Test scale					0.1986	0.788

Appendix 1 presents the restructuring of some variables using multiple correspondence analysis (MCA). The MCA is suitable for restructuring ordered categorical variables (Adediran et al. 2021).

Table 2: Descriptive Statistics

Variables	N	Min	max	mean	sd	variance	skewness	kurtosis
Gender	100	0	1	0.7	0.461	0.212	-0.872	1.762
Age	100	0	2	1.14	0.765	0.586	-0.241	1.754
20-29	50	0	0	1.14	0.765	0.586	-0.241	1.754
30-39	25	0	1	1.14	0.766	0.586	-0.241	1.754
40 and above	25	0	2	1.14	0.766	0.586	-0.241	1.754
Young	100	0	4	2.75	1.388	1.927	-1.026	2.667
Ptdemo	100	0	4	2.64	1.235	1.526	-0.874	2.592
Tledu	100	0	4	2.73	1.392	1.936	-0.843	2.299
Teacher perception	100	0	4	1.97	1.521	2.312	0.103	1.428
Utclass	100	0	4	3.12	1.225	1.501	-1.324	3.481
Mtlconf	100	0	4	2.28	1.341	1.799	-0.293	1.663
Sueasily	100	0	4	3.29	0.977	0.956	-1.845	6.432
Tessent	100	0	4	3.4	0.752	0.566	-1.947	9.255
Tisaachi	100	0	4	3.12	1.157	1.339	-1.336	3.713
Teibts	100	0	4	3.14	1.119	1.253	-1.494	4.439
Ttolfiip	100	0	4	2.93	1.257	1.581	-1.247	3.429
Ictoppo	100	0	4	3.57	0.742	0.551	-2.701	12.589
Technology use index	100	-3.817	0.248	-0	0.553	0.305	-5.597	36.314

Table 2: Presents summary statistics of transformed key variables from the responses. Gender is a dummy variable, where females are 1 and otherwise 0. The data consists of about 70% female respondents, reflecting the importance of women in child development and nation-building. The respondents' ages were grouped into three age

categories: 20-29, 30-39, and 40 and above. The teacher perception questions or variables are on a 5-point Likert scale. The normal skewness is zero. Some variables are less than one, which implies that they are normally distributed, while the variables are negatively skewed to the extreme left tail. The kurtosis measures the peakedness of the variables, and some are platykurtic as they are less than 3. Some variables are leptokurtic because they are greater than 3. From the summary statistics, the results suggest that some variables in the sample are not normally distributed.

5. Findings and Interpretation

This section presents analytical findings using ordinary least squares (OLS) regression and structural equation models.

Table 3: Teachers' beliefs in the use of technology in teaching and learning

Variables	(1) Index of use of technology in teaching
Perception	0.04 (0.04)
Constant	-0.08 (0.09)
Observations	100
R-squared	0.01

Standard errors in parentheses: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3 indicates no apparent relationship between teacher perceptions and technology usage in T&L. However, teacher perceptions have a positive relationship with the use of ICT, but it is not statistically significant. In other words, a 4% unit increase in teacher perception indicates a possible boost in the usage of ICT in teaching. The result suggests that teachers' awareness of the benefits of using technology may improve the integration of ICT, thus the quality of T&L in schools.

The study used a Structural Equation Model (SEM) to estimate the effect of teachers' beliefs on the usage of technology in T&L in their classrooms. SEM was the appropriate statistical technique as the study involved multiple associations between the dependent and the independent variables.

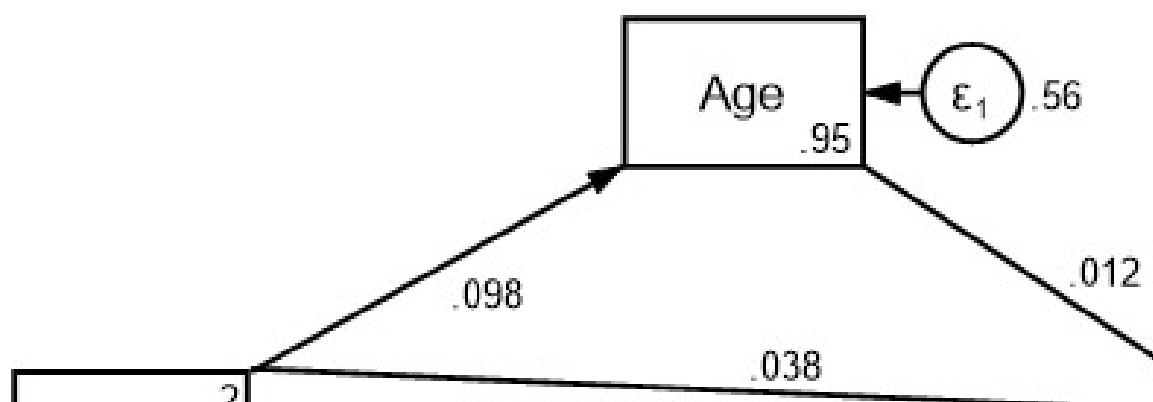


Figure 1: SEM for Demographic characteristics and the use of technology in (T&L).

Figure 1 indicates that the effect of teachers' perceptions has a positive impact on the use of ICT in teaching and learning through the age of the teachers. This implies that the age of the teachers is an influential factor in determining their passion for the use of technology in T&L. Further, a teacher's perception has a direct positive relationship with the use of ICT in T&L by 3.8%.

Table 3 presents a structural equation model (SEM) of the effect of teachers' perception of the use of technology in teaching and learning, mediated by the age of the teachers. The teachers' perception and age have an insignificant positive effect on the use of technology in teaching and learning. Teacher perceptions have a positive relationship with the use of ICT, but it is not statistically significant. In other words, a 4% unit increase in teacher perception indicates a possible boost in the usage of ICT in teaching. The result suggests that teachers' awareness of the benefit of using technology may improve the integration of ICT, thus the quality of T&L in schools.

Table 2 in Appendix 2 shows the test results have a goodness of fit for the effect of teachers' perception of the use of technology in teaching and learning. The Root mean squared error of approximation (RMSEA) value is less than 0.05, and the Standardized root mean squared residual (SRMR) is 0.000, less than 0.05. This implies a proper fit of the model for the data.

6. Conclusion and Recommendations

This study used primary data collected from the administered questionnaire to several selected teachers teaching early childhood learners in the Agege Local Government Area of Lagos State. The study presents the summary statistics of key variables transformed from the questions. The analysis was divided into two parts according to the study's objectives, and ordinary test squares and structural equation models were employed. The study investigated the relationship between the early childhood teachers' perceptions and technology use in the classroom. The tables reveal those mentioned above, which show a non-significant positive relationship between the

teacher's perception and the use of ICT in teaching and learning. It was also discovered that a unit increase in the teachers' belief could boost the use of ICT in teaching learners by 4%, which connotes improvements in the application of technology in the classroom. The variables used in predicting ICT usage were positive. Nevertheless, in the case of some underdeveloped countries like Nigeria, the poor payment of teachers and lack of technological tools and funding are a disadvantage to quality teaching.

This current study makes some recommendations. The government should provide financial support to primary schools in Lagos State to enable them to acquire more technological equipment to manage the existing ones, enhance teachers' technology skills and improve the early acquisition of technological knowledge for early childhood learners. There should be a regular and constant electricity supply in all public primary schools in Lagos State, especially in the Agege Local Government. The government should provide an alternative power supply in either solar power or generators in case of power failure. Those with the technical know-how should be employed to manage the ICT facilities or centres in all primary schools in Lagos State. Learners in primary school should be given a free hand to operate age-appropriate ICT equipment with adequate supervision and encouragement.

In conclusion, the school curriculum should encourage ICT training in primary and pre-primary schools to enhance learning prospects through digital technologies during early childhood development. One of the limitations of this study is that it could not suggest whether the use of ICT improves the learners' academic performance. However, the study recommends further study on the impact of ICT on learner performance.

Data Availability Statement

The authors take responsibility for data integrity and the accuracy of the analysis. The data is available to other researchers upon request. We confirm compliance with the research principles of the informed consent obtained.

Conflict Of Interest

The authors declare no conflict of interest in writing the manuscript.

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Appendix

Remarkably, early childhood teachers' perceptions influence technology use in teaching and learning, but not significantly. Furthermore, the SEM tabulated result is presented below.

Table 4: Structural Equation Model Output

Structural equation model Number of obs = 100

Estimation method = ml

Log-likelihood = -377.56506

-----+-----						
	OIM					
	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
-----+-----						
Structural						
Age						
npece	.0979424	.049392	1.98	0.047	.0011359	.1947489
_cons	.9470534	.1226871	7.72	0.000	.7065911	1.187516
-----+-----						
techindex						
Age	.0124438	.0731514	0.17	0.865	-.1309304	.1558179
npece	.0376359	.0368344	1.02	0.307	-.0345583	.1098301
_cons	-.0883287	.1133758	-0.78	0.436	-.3105412	.1338838
-----+-----						
var(e.Age)	.5584413	.0789755			.4232524	.7368102
var(e.techindex)	.2988292	.0422608			.2264879	.3942767

LR test of model vs. saturated: chi2(0) = 0.00, Prob > chi2 =