Instructional Delivery Models and Academic Performance of Agricultural Science Students in Senior Secondary Schools in Rivers State, Nigeria

Dr. Hillary Wordu[1] & Akor, Victor Ojorka[2]
Department of Educational Foundations
Faculty of Education
Rivers State University
Port Harcourt.
[1]drworduhillary@gmail.com, [2]victorojorka@gmail.com

Abstract
This study investigated instructional delivery models and students' academic performance in senior secondary school Agricultural Sciences in Rivers State, Nigeria. The research work used pure experimental design (posttest only) with a population of 100 students and a sample size of 60 derived by random sampling technique. The study was guided by four research questions and four hypotheses. The instrument for data collection was a teacher made performance assessment test (TMPAT) by the researcher with 20 items questions. The instrument was validated by three experts. Data analysis was done using mean and standard deviation and the hypotheses tested using t-test and ANOVA. Findings revealed that mastery learning and constructivist instructional delivery models improved students' academic performance more than lecture instructional delivery model. The paper therefore, recommended the use of mastery learning instructional delivery model, constructivist instructional delivery model and that the lecture instructional delivery model must be used in combination with other approaches to instructing students for effectiveness. Teachers were also encouraged to get training regular, employ improvisation in teaching and that teachers should allow their students generate ideas when using the constructivist instructional delivery model for better academic performance.

Keywords: *Instructional delivery model, academic performance, Agricultural Science*

Introduction
The term instructional is described by the Oxford Advanced Learner Dictionary 8th Edition by Hornby (2015), as an adjective derived from the concept of instruction and it connotes when someone teaches people something. An instruction has been defined as the last phase of curriculum implementation. This means that when instruction is given in this way, it is meant towards curriculum showing that it is an act of implementation. Jeremiah and Alamina (2017) has been described instruction as all activities engaged in by the teacher with the aim of facilitating change in learner behavior using different kinds of delivery attempts.

Instructional delivery models on the other hand are methods, strategies, approaches or even techniques that a teacher employ to deliver his/her subject matter of a lesson to the learners. It can as well be regarded as a representation of a pattern in which a lesson is to be presented (Nwafor, 2007). The process of instructional delivery must be based on stated objectives of the lesson, it is based on this that when the process of instructional delivery is over, then the opportunity to determine if the aim of the lesson has been achieved or not comes, which is the evaluation act that will tell if the lesson met stated objectives (Buseri & Dorgu 2011). Instructional delivery has been seen as the process showing every activity the teacher and the

learner does in a classroom setting. So every effort that the teacher makes in order to have a fruitful time with the students by exposing the contents, employing methods, strategies, the pupils interaction with the environment, resources available and even the evaluation process sums up to mean instructional delivery (Mezieobi, 2009). When a teacher consciously utilizes his training, knowledge, skills and value and relays it in order to change the behavioral position of the learner, he is carrying out instructional delivery. For Etuk & Umoh (2003), they see instructional delivery as the knowledge of teaching techniques and their application for learning to take place in such a flexible manner that would not distort the original intent of the teacher for being in the classroom.

Instructional delivery models in senior secondary school Agricultural science could be described then as the science of the application of professional Agricultural Science teacher's knowledge, skills, attitude and value systems transmission towards enhancing the learning ability of an Agricultural Science student. The essence of the use of different instructional delivery models according to Voltz, Sims and Nelson (2010) is to enable the instructor (teacher) surmount the challenges on the organization and passage of the instruction to students who are assumed to have come from different backgrounds, therefore, possess different learning styles, pace and understanding the lessons based on their previous knowledge.

However, the instructional model or method used in teaching Agricultural Science in senior secondary school will not deviate from the philosophy of the subject which stresses pragmatism in teaching, use of analytical and prescriptive approaches, where learning is perceived as being from the present life and work experience, and knowledge expected to be discovered from research; meaning that the value of education is attached to learning by doing. The descriptions so presented seem to be pointing at instructional delivery models that would involve more of student activity in the learning process.

From the foregoing, it is clear to us that one model of instruction will not be able to bring about an effective instructional delivery that can produce the kind of result desired from the learners. The nature of this subject will demand for the teacher to employ numerous models, methods, strategies, approaches or techniques to ensure that the learners learn indeed after every instruction. So because we have earlier established that instructional delivery is a deliberate interface between the learner and the learning activities, therefore, it is from this interaction process that learning actually takes place (Akudolu, 2006). This interface is the implementation stage of the curriculum. Here, the teacher, the learner and the learning activities are on stage. The teacher who is the leader on this stage is free at this point to modify the plan of action based on the reaction of the learners to the learning activities in order to promote learning. The modification act would now make him to employ any of the instructional delivery models which according to Vikoo (2003) are presented under three categories of: cognitive development models, affective development models and the psychomotor development models. These models for the cognitive may include – Discussion, Questioning, Team teaching, Talk and Chalk, Field trips etc. For the affective, they are simulation, dramatic role playing etc, while the psychomotor can be inquiry, discovery, process approaches, demonstration, laboratory, programmed instruction, assignment, project, micro-teaching and mastery models (Dorgu, 2015). These are models that the teacher uses in carrying out his/her job of instruction which he does for four major reasons according to Dike (2018), as persuasion, education, information and for entertainment. According to (Jeremiah & Alamina, 2017), instructional delivery models can be categorized as Teacher centred models, Learner centred models and Innovative models. They listed the teacher centred models to include lecture, demonstration and story-telling models. The leaner centred models they named are play-away,

project, discussion and field trip while the innovative models are thus, constructivism, concept mapping, flipped teaching, cooperative and mobile instruction. While some of the models listed would accept being put into use for one person at a time others are more effectively maximized when used for group instruction. Amadioha (2017), in an attempt to support the above view these models says that in a lesson episode that the name given to an instructional delivery model is based on the dominating activity carried out in the instructional delivery process. This implies that there is no lesson event that uses entirely the particular title of the instructional delivery model so referred or claimed to be used rather that the models referred to would have been used in partnership with one or more other models whose activities were not clearly observable. The blended instructional delivery models represent the innovative instructional delivery models available to the researcher. Examples of the blended models according to (Etuk & Umoh, 2003), are: the mastery learning instructional delivery model, student tutorial instructional delivery model, individualized learning instructional delivery model, futuristic forecasting instructional delivery model, cooperative instructional delivery model etc., while Jeremiah and Alamina (2017), already declared that the constructivism model is a blended instructional delivery model.

Earlier, we did mention that while some of the models are suitable for use for one person at a time, others are only acceptable for group use at a particular point in time and, again, that agricultural science is a subject based on learning by doing, it simply by implication means that the senior secondary school agricultural science is given more to the blended models than the other. This is an indication to say that the most suitable instructional delivery models to use in determining student academic performance in agricultural science would be the blended instructional delivery models. So to do this, the blended instructional delivery models (the mastery instructional delivery model and the constructivism instructional delivery model and also the lecture instructional delivery model shall be the focus in this study. Mastery instructional delivery model allows for instruction based on specifically stated objectives after which the learners are tested and until they master the lesson they will not be allowed to take on a new lesson (Etuk & Umoh, 2003). While the constructivism instructional delivery model does instructional delivery and learning by using different kinds of instructional delivery techniques at the same time in achieving an effective instructional process (Jeremiah & Alamina, 2017). Lecture instructional delivery model is simply the oratory presentation of lesson contents from a teacher to the learners.

The work of the teacher through instructional delivery models on the domains does not seem to yield immediate observable outcomes, the result is usually seen or observable after sometime. Academic performance refers to different levels of measurable and observable behavior of learners after an instructional process. For Yusuf (2005), he described academic performance as all the observable and/or measurable behavior of a person after an academic exercise. This he said can only be measured or observed when a performance test like a mental test is administered to the learner in a situation whereby the person involved will be expected to do something instead of saying something. So at any point in time when a student's observable and measurable behavior assessment is done, then what is taking place is academic performance assessment (Akudulo, 2006). Academic performance consists of the scores obtained at any particular time from a teacher-made assessment test. So when a student performs a behavior expected for an educational intention, the outcome so referred to is academic performance.

There is so much increase in student's poor academic performance in the senior secondary school Agricultural Science examination conducted by the West African Examination Council

(WAEC) at the Senior Secondary Certificate Examination (SSCE) and the National Examination Council in the entire country (Obika 2003). He added that one of the reasons that makes students to perform poorly is due to inadequate mastery of concepts which may have resulted from the instructional delivery model(s) used in teaching the subject that perhaps have been a teacher centred method where the learner is seen as an open hole to be filled with knowledge, skills, attitudes and values. This is confirmed by the West African Examination Council Chief Examiner's Report (WAEC, 2008) as shown on the table below:

West African Senior School Certificate Examination Result on Agricultural Science May/June 2004-2006

Year	Total Entries	% Credit Passes	% Failure
2004	833,217	23.48	43.87
2005	872,811	15.51	53.46
2006	941,322	35.01	35.42

The report decried the general poor performance of students in the subject with an average pass level of 24.67% and a failure level of 44.25% within the period reported, where the failure level was almost double of the percentage pass level. Some of the reasons said to be responsible for the poor performance from the report included declining quality of education in secondary schools in Nigeria, poor preparation by students for examinations, use of poor teaching strategies by teachers, inadequate availability of textbooks, poor knowledge of the subjects by the students and poor reading habit. Ten years after (2016), the chief examiners report also capture the following: inadequate knowledge of scientific concepts, inadequate preparation for examination, poor observation skills, poor understanding of tasks, poor knowledge of practical skills, poor calculation skills and poor grammatical construction skills as the reasons again being responsible for students failure in WAEC which is akin to the earlier report. A report that seem to mean to the researcher that teachers of this subject are being indicted since their students may only be reflecting what they have received from their teachers over the years.

In the work done by (Onyibor, 2000), he had found out that poor academic performance result among students is majorly an indication of the use of poor or wrong methodologies for instructional delivery and advised that more studies be done on instructional delivery strategies that can enhance students' academic performance. It is in response to this call for more innovative instructional models to be put into use for better students' academic performance in senior secondary school subjects, particularly, in Agricultural Science that it has become necessary for this study to investigate instructional delivery models and students' academic performance in senior secondary school Agricultural Science in Rivers State, Nigeria.

Purpose of the Study:
The general purpose of this study was to investigate instructional delivery models and students' academic performance in Senior Secondary School Agricultural Science in Rivers State, Nigeria. Specifically, it will seek to determine:
1. Academic performance of students exposed to lecture and mastery learning instructional delivery models in senior secondary school Agricultural Science.
2. Academic performance of students exposed to lecture and constructivist instructional delivery models in senior secondary school Agricultural Science.

3. Academic performance of students exposed to mastery learning and constructivist instructional delivery models in senior secondary school Agricultural Science.
4. The students' academic performance based on the instructional models in senior secondary school Agricultural Science.

Research Questions:
The following research questions guided this study:
1. What is the extent of the students' performance using the lecture and mastery learning instructional delivery models.
2. What is the extent of the students' performance using the lecture and constructivist instructional delivery models.
3. What is the extent of the students' performance using the mastery learning and constructivist instructional delivery models.
4. To what extent did instructional delivery models affect the students' academic performance.

Hypotheses:
The following hypotheses guided this study (P≥ 0.05):

HO$_1$: There is no significant difference between the academic performance of students exposed to the lecture and those exposed to the mastery learning instructional delivery models in senior secondary school Agricultural Science.

HO$_2$: There is no significant difference between the academic performance of the students exposed to the lecture and those exposed to the constructivist instructional delivery models in senior secondary school Agricultural Science.

HO$_3$: There is no significant difference between the academic performance of the students exposed to the mastery learning and those exposed to the constructivist instructional delivery models in senior secondary school Agricultural Science.

HO$_4$: There is no significant difference between students' academic performance in senior secondary school Agricultural Science based on the instructional delivery models.

Methodology
The research design adopted is pure experimental design (post-test only) which is described by Ali (2006) as the research design that is concerned with identifying caused and effect relationship between a dependent and an independent variable. The use of the design is justifiable as the study is made up of homogenous groups and to ensures adequate control for the basic treatments effects to operate which are randomly assigned and very effective at reducing to the barest minimum if not eliminate internal and external validity threats to the experiment. The study used three experimental treatments and a control (A, Mastery learning instructional delivery model, B, Lecture instructional delivery model is the control and C, Constructivist instructional delivery models. The experiment was conducted in a secondary school Etche in Rivers State of Nigeria, a sub-locality of Greater Port Harcourt Township, particularly Community Secondary School, Nihi, Etche L.G.A. Rivers State, Nigeria in October 2018.The population for the study was 100 Senior Secondary Schools (SSS) II students of Community Secondary School Nihi, a public school in Nihi, Etche L.G.A., Rivers State, Nigeria. The sample for the research was 60 students randomly selected from the groups into two treatments and a control sub-groups using balloting and the sampling technique adopted was the random sampling technique which was informed by its ease of use and the ability to produce accurate results. The instrument for data collection was a 20-item teacher made performance assessment test question constructed by the researcher on the instructional delivery models and student's academic performance in senior secondary school Agricultural

Science in Rivers State. The validation of the performance assessment instrument for data collection which is made up of a 20-items question of teacher made performance assessment test (TMPAT) was developed by researcher and validated by three experts from Rivers State University, Nkpolu-Oroworukwo, Port Harcourt. One of them from the Educational Foundations Department (Curriculum and Instruction Option) and the other two from Science Education Department (Agricultural Education Option). Each expert was required to peruse the items and make necessary suggestion that was used to improve the strength of the instrument. Their suggestions were used to make the final copy for this research work. The 20-items questions were administered to the sampled groups of students selected for the experiment (treatment and control) and they were assessed to determine the performance of the various sub-groups (A, B and C). The data collected was analyzed to obtain the mean and standard deviation for answering the research questions while the hypotheses was statistically tested at 0.05 level of significance using t-test and Analysis of variance (ANOVA).The decision rule on the null hypothesis was to reject the hypothesis whose calculated t-value and f-value is greater than the critical t-value and f- value but otherwise accept.

Results

Research question1: What is the extent of the students' performance using the lecture and the mastery learning instructional delivery models.

Table 1: Showing the Mean Academic Performance and Standard Deviation of Students Taught with the Lecture and the Mastery Learning Instructional Delivery Models

Instructional Delivery Models	Number of Students (N)	Mean (X)	Standard Deviation (SD)
Lecture Model	20	24.6	3.03
Mastery Learning Model	20	29.6	4.19
Total	40	54.2	7.22

Table 1 shows that the mean score of students taught with lecture instructional delivery model is 24.6 with a standard deviation of 3.03 while those taught with mastery learning instructional delivery model had a mean of 29.6 with a standard deviation of 4.19.From the mean and standard deviation obtained as shown on table 1, the students taught with the mastery learning instructional delivery model had better academic performance than the students taught with lecture instructional model.

Research question 2: What is the extent of the students' performance using the lecture and constructivist instructional delivery models.

Table 2: Showing the Mean Academic Performance and Standard Deviation of Students Taught with the Lecture and the Constructivist Instructional Delivery Models

Instructional Delivery Models	Number of Students (N)	Mean (X)	Standard Deviation (SD)
Lecture Model	20	24.6	3.03
Constructivist Model	20	27	5.33
Total	40	51.6	8.36

Table 1 shows that the mean score of students taught with lecture instructional delivery model is 24.6 with a standard deviation of 3.03 while those taught with mastery learning instructional delivery model had a mean of 27 with a standard deviation of 5.33.From the mean and standard deviation obtained as shown on table 2, the students taught with constructivist instructional delivery model had better academic performance than the students taught with lecture instructional model.

Research question 3: What is the extent of the students' performance using the mastery learning and constructivist instructional delivery models.

Table 3: Mean Academic Performance and Standard Deviation of Students Taught with the Mastery Learning and the Constructivist Instructional Delivery Models

Instructional Delivery Models	Number of Students	Mean	Standard Deviation
Mastery Learning Model	**20**	**29.6**	**4.19**
Constructivist Model	**20**	**27**	**5.33**
Total	**40**	**56.6**	**9.52**

Table 3 shows that the mean score of students taught with mastery learning instructional delivery model is 29.6 with a standard deviation of 4.19 while those taught with constructivist instructional delivery model had a mean of 27 with a standard deviation of 5.33.From the mean and standard deviation obtained as shown on table 3, the students taught with mastery learning instructional delivery model had better academic performance mean than the students taught with the constructivist instructional model.

HO1: There is no significant difference between the academic performance of students exposed to the lecture and those exposed to the mastery learning instructional delivery models in senior secondary school Agricultural Science.

Table 4: t-test analysis of students' academic performance in SSS Agricultural Science

Instructional Delivery Model	X	SD	N	df	StdE	t-cal	t-crit
Lecture	**24.6**	**3.03**	**20**	**38**	**1.16**	**4.31**	**2.02**
Mastery	**29.6**	**4.19**	**20**				

Table 4 above shows t-calculated value 4.13 higher than t-critical value 2.02, an indication that there is significant difference between the students taught with the lecture and mastery learning instructional delivery models. Therefore, the null hypothesis is rejected.

HO2: There is no significant difference between the academic performance of the students exposed to the lecture and those exposed to the constructivist instructional delivery models in senior secondary school Agricultural Science.

Table 5: t-test mean analysis of students' academic performance in SSS Agricultural Science

Instructional Delivery Model	X	SD	N	df	StdE	t-cal	t-crit
Lecture	24.6	3.03	20	38	1.37	1.75	2.02
Constructivist	27	5.33	20				

Table 5 shows no significant difference between the lecture and the constructivist instructional delivery model as the t-calculated value of 1.75 is less than the t-critical value of 2.02. Hence, the null hypothesis is upheld.

HO3: There is no significant difference between the academic performance of the students exposed to the mastery learning and those exposed to the constructivist instructional delivery models in senior secondary school Agricultural Science.

Table 6: t-test mean analysis of students' academic performance in SSS Agricultural Science

Instructional Delivery Model	X	SD	N	df	StdE	t-cal	t-crit
Mastery	29.6	4.19	20	38	1.52	1.71	2.02
Constructivist	27	5.33	20				

Table 6 above shows t-calculated value 1.71 lesser than t-critical value 2.02, an indication that there is no significant difference between the students taught with the mastery learning and the constructivist instructional delivery models. Therefore, the null hypothesis is retained.

HO4: There is no significant difference between students' academic performance in senior secondary school Agricultural Science based on the instructional delivery models.

Table 7: ANOVA Summary table of the instructional delivery models

Source of Variance	Sum of Squares (SS)	df	Mean of Squares (MS)	f-cal	f-crit
Between Group	250.13	2	125.07	5.5	3.11
Within Group	1298.46	57	22.78		
Total	1548.59	59	21.99		

Table 7 shows that f-calculated value 5.5 higher than f-critical value 3.11. This shows that there exists significant difference between the instructional delivery models used in instructing the students. Therefore the null hypothesis is rejected.

Table 8: Scheffe Test showing analysis of the significant differences between the instructional delivery models

Instructional Delivery Models	df	f-cal	f-crit
Lecture and Mastery Learning	57	2.63	2.48
Lecture and Constructivist	57	1.20	2.48
Mastery Learning and Constructivist	57	1.43	2.48

Table 8 above shows that there is significant difference between the lecture and mastery learning instructional delivery models where the f-calculated is 2.63 higher than f-critical 2.48,so, null hypothesis is upheld but for the lecture and constructivist, and mastery learning and constructivist instructional delivery models with f-calculated 1.20 and 1.43 with the same f-critical value of 2.48,there is no significant difference between these instructional delivery models, therefore, null hypothesis is accepted.

Discussion of the Findings
The finding from the study show that the mastery instructional delivery model produced a better result in terms of the mean output and in comparison with the lecture instructional delivery model in the academic performance of the senior secondary school Agricultural Science as well as the most suitable in implementing the curriculum of the subject. This confirms the findings of Wanbugu & Changeiywo (2008) and (Mitee & Obaitan, 2015; Oluwatosin & Bello, 2015;, Iserameiya & Ibereme, 2018) who found mastery learning a more effective curriculum implementation strategy and went ahead to recommend it to teachers to use it. However, it was observed that there was no significant difference between the use of mastery learning and constructivist instructional delivery model. This is implies that neither of the mastery learning nor the constructivist instructional delivery model is better than the other when it comes to instructing in senior secondary school Agricultural Science.

Nonetheless, it was found out in this study that the constructivist instructional delivery model is also a better approach for instructing students in senior secondary school Agricultural Science than the lecture instructional delivery model based on the mean score obtained by the students. Clearly, this affirms the findings of Oludipe & Oludipe (2010) and Etuk, Etuk, Etudor-Eyo & Jeremiah (2011) that constructivist instructional delivery model helps students perform better and unlike the findings of Williams & Ochiama (2018) constructivist instructional delivery model from the findings of the present study is about as effective in enhancing improvement in performance of the students as mastery learning instructional delivery model as there was no significant difference between them when they were statistically analysed using Scheffe test.

Subsequently, it imperative to say that the findings of this study again has confirmed that the lecture instructional delivery model is the least effective when it comes to instructing students on senior secondary school Agricultural Science based on the mean score obtained by the students and the result of the statistical analysis on the tables above. Though, it is not to outrightly rule out the use of lecture in instructing students in Agricultural Science but that it should be used in combination with other models that could help improve students' academic performance

Conclusion
Based on the findings of this study it hereby concluded that the most effective instructional delivery model for the senior secondary school Agricultural Science in the order the researcher

has seen students' academic performance improved should be used accordingly as in the mastery learning, the constructivist and the lecture instructional delivery model which but must be used in addition with any other strategy that can boost students' academic performance.

Recommendations

The following are the recommendations supporting this research study:

1. That senior secondary school Agricultural Science teacher used mastery learning instructional delivery model in teaching the subject.
2. That senior secondary school Agricultural Science teacher should find ways of using the constructivist instructional delivery model since it builds independent study habits in the students
3. That if lecture instructional delivery model must be used in teaching that is should come into use in combination with other strategies that would enhance its use.
4. Senior secondary schools Agricultural Science teachers should make every effort to be given to regular training and retraining programmes that can improve their teaching skills and enhance the students' academic performance.
5. That improvisation must be applied in every instructional delivery episode for senior secondary schools students to have the best of their teaching learning time.
6. That flexible in the time table must be encouraged by any teacher and school that wants to adopt either the mastery learning or constructivist instructional delivery model to enable the students obtain the utmost benefit inherent.
7. That in the use of constructivist instructional delivery model that all student be given the opportunity to share every and any idea generated to form part of the learning process, so, no idea should be regarded as stupid but may be further refined to be better for better learning and academic performance.

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