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# Logistic regression analysis of the effects of modular curriculum design on students understanding level

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**Abstract**
This study was intended to to investgate the influence of modular based curriculum on students understanding level in Wolaiata Sodo University, College of Natural and Computatinal Science. The key purpose of the is to find out the effectiveness of modular approach in teaching order of assessing the student learning, performance and achievement; and to determine whether the modular teaching is more effective than traditional methods.
The study was experimental type and survey type. The sample for this study was drawn from the students of College of Natural and Computational Science. Sample size was consisted of 130 students. The data were collected from both groups (controlled and experimental). The survey data were collected using self-administered questionnaire. Questionare included some socio-demographic, Economic, students' academic variables. Data were cleared and and analsed using SPSS version 16.0. Ordinal Logistic regression was employed in methods of data analysis. The variables which has correlates with understanding level of students were identified using the ordinal logistic regression analysis.
The results revealed that students' scores were in the favor of usage of modular teaching approach. So, it is recommended that the modular approach should be widely used at university levels of education in Wolaiata Sodo University, Natural and Computational Science College, in partical and in Ethiopian University in general. And it is also recommended that scientific measurments should be taken for variables which makes significant varation on students understanding level. It is also believed that this study can be used as a base line information for further study of the problems on large scale of regional or national level.

**Keywords:** modular approach, self-learning, logistic regression, student understanding

## 1. Introduction

### 1.1. Background of the Study

Wolaiata Sodo University was one of government recognized universities in Ethiopia. It was established in 2008 GC with mission of the provision of quality education, community service with a highest quality and minimum cost, the conduct of societal problem solving-demand driven research and the provision of support services with a highest customer satisfaction with auding quality of teaching-learning process, and quality of the research and community services.
University believes that Education was the base for economic and social development, and through education one can develop skills, promote progress and be relevant to the needed of the country. A diversed body of literature demonstrates that the future development of the world and individual relies on the capacity of individuals and countries to acquire, adapt, and advance knowledge. This capacity depends, in turn, on the extent to which the population had attained literacy, innumeracy, communication, and problem solving skills. Many government view investments in education as a better and cost effective scheme through which social, health, and economic issues such as delinquency, unemployment, gender equity and nutrition can be addressed. Therefore, over all development efforts, high priority should be given to education, (Shindu.J.S 1992).
To live in the modern world, every person needs certain basic information, and it was a task of education to transmit this information to people. In order to address these objectives, one need well organized program of study that school and the education would implement.

**Rationale of the Modularization:** Wolaiata Sodo University University along with other Higher Education Institutions in Ethiopia has embarked on major reform for the past ten years. As part of this reform process, modularization of curricula has been proposed as the best way to improve student learning and produce competent global graduates. The basis for modularization is the change in emphasis from teaching to learning and to more student-centered curricula and competence-based education. This change has impacted on the curriculum design process with a greater emphasis on learning in terms of knowledge, skills and competencies within modules and the focus on the design of effective learning environments. Modularization is, therefore, believed to increase the degree of comparability and compatibility, curriculum flexibility and student mobility. It also strengthens the relationship between the world of education and the world of work.

### 1.2. Statement of the Problem

As the study made by in Centre for British Teachers in 2008, as cited by Gedefaw Kassie Mengistu (2012) the education

system in Ethiopia, at all levels, is challenged by a lack of quality. The reason for this problem has been attributed to the poor standard of those entering the teaching profession, the high teacher turnover, the low proportion of qualified teachers, and problems such as course delivery and curriculum design. The old method of course deliver (teacher centered) system had its own negative impact on the success of students. This study was conducted to investigate the effect of modular based teaching methods on students understanding level at Wolaiata Sodo University. Regarding this objective the following basic questions were adressed.

- What are the factors affecting level of understanding of students?
- What was the students' attitudes toward modular curriculum design?
- What made students be success in their academic performance?

### 1.3. Objective of the Study

The general objective of this study was to determine the influence modular curriculem design on students level of understandings? Specifically:

- To know the level of understanding of students.
- To determine the relationship between level of understanding and academic performance.
- To assess the major determints of variation in level of understanding.

## 3. Methodology

### 3.3. Variables in the Study

Dependent variabele:-Students Level of understanding (Good, Moderate, Poor)
Independent variables:-

- Sex: (Male, Female)
- Age: (20-23, 24-27, 28-30, >=31)
- Fathers education Level : (Uneducated, Primary, Diploma, Degree and above)
- Attending class of students: ( Always, Sometimes, Usually )
- Method of study: (Modular based study, Semester based study)
- Covering content of teacher: (Strongly agree, Agree, Disagree, Strongly disagree )
- Plan of teachers on accademy: (Strongly agree, Agree, Disagree, Strongly disagree )
- Time of study: (1-3, 4-5, 6-7, >=7 )
- CGPA: ( 2.00-2.50, 2.55-3.00, 3.15-3.50, 3.55-4.00 )
- Department: (Statistics, Mathematics, Meteorology and Hydrology, Geology,
- Biology, Chemistry, Sport, Physics)

### 3.4 Sampling Techniques and Sample Size Determination

Sampling techniqueis a system of taking small ratio of observation from a large population to get information of that large population from the sampled observation by using some statistical techniques. In this study stratified random sampling is used determine the sample. Stratified sampling was a technique, which uses relevant information that may be available, in order to increase efficiency.

The total number of samples 'n' would be calculated as follows:-

$$n = \frac{\sum_{i=1}^{n} WhQhPh}{V+\frac{1}{N}\sum_{i=1}^{n} WhQhPh} = \frac{\sum \frac{W_h P_h Q_h}{V}}{1+\frac{1}{NV}\sum W_h P_h Q_h}$$

Using the pilot survey the value of $P_h$ and $Q_h$ was obtained as follows:-

$P_1 = \frac{1}{10} = 0.1$ and $Q_1 = \frac{9}{10} = 0.9$

$P_2 = \frac{3}{10} = 0.3$ and $Q_2 = \frac{7}{10} = 0.7$

Where: - **N** = 942, total number of students in Wolaiata Sodo University, Natural and Computational Science College.
Applying the formula,

$$n = \frac{\sum \frac{W_h P_h Q_h}{V}}{1+\frac{1}{NV}\sum W_h P_h Q_h} = 170$$

### 2.4 Method of Data Analysis

In order to meet the objective set up on this study Ordinal logistic regression model and tests related are employed as a general methodology.

**Logistic Regression Model**

Logistic regression is used to predict the probability of dependent variable on the basis of independent variables and to determine the effect size of the independent variables on the dependent; to rank the relative importance of independents; to assess interaction effects; and to understand the impact of covariate control variables. The impact of predictorvariables is usually explained in terms of odds ratio and hence the name logisticregression, also called the log-odds function. This model applies maximum like lihoodestimation after transforming the dependent into a logit variable (the natural log of theodds of the dependent occurring or not).

Assumptions of Logistic Regression

The validity of inferences drawn from modern statistical modeling techniques depends onthe assumptions of the statistical model being satisfied. In order to valid the analysis themodel should satisfy the following assumptions.

1. It does not need a linear relationship between the dependent and in dependent variables.
2. The error terms need to be independent.
3. Model shouldhave no multicollinearity.
4. It assumes linearity of independent variables and log odds
5. Logistic regression requires quite large sample sizes.
6. Ordinal Logistic Regression Model

Logistic regression model can be classified as multinomial, ordinal and binary. In this investigation Ordinal logistic regression model was used. The ordinal logistic regression procedure empower one to select the predictive model for ordered dependent variables.It describes the relationship of an ordered response variable and a set of explanatory variables. The explanatory variables may be continuous or discrete (or any type). The most popular model in ordinal logistic is the Proportional Odds model.

Proportional Odds (PO) Model

In the proportional odds model the cumulative logits can be represented asparallel linear functions of independent variables i.e for each cumulative logit theparameters of the models are the same, except for the intercept. Consequently, accordingto the proportional odds assumption odds ratio is the same for all categories of theresponse variable.

Let Y takes categorical response variable with *c* ordered categories and assume pro (Y=1) is $p_1$ Pro (Y=2) is $p_{2.....}$ pro (Y= i) is $p_i$ ;for i=1,2,3….c. Cumulative probability reflect the ordering, with pro (Y$\leq$1) $\leq$Pro (Y$\leq$2) $\leq \cdots \leq$pro (Y$\leq$ i)=1and let thecumulative probability of the first c -1 of Y is pro (Y$\leq$ i)= $\boldsymbol{\pi i}$ for i=1,2…c-1.Then the odds of the first c -1 cumulative

Probabilities are*odds* (pro(Y$\leq$ i)) = $\frac{pr(Y\leq i)}{1-pr(Y\leq 1)} = \frac{\pi i}{1-\pi i}$i=1, 2….c-1

In the Proportional Odds model, the log odds of the the first *c* -1 cumulative probabilities is given as:

$$logit[pr(Y \leq i)] = \log\left[\frac{pr(Y\leq i)}{1-pr(Y\leq i)}\right] = \log\left[\frac{\pi_i}{1-\pi_i}\right] = \log[\frac{\pi_i}{1-\pi_i}] \quad (1)$$

And the relationship between the cumulative logits of Y is:

$$\log\left[\frac{\pi_i}{1-\pi_i}\right] = \log\left[\frac{\pi_i}{\pi_{i+1}+\cdots+\pi_c}\right]; i = 1,\ldots,c-1$$

Consider a collection of *P* explanatory variables denoted by the vector *X* '= ($X_1$, $X_2$... $X_p$). The relationship between the predictor and response variables is not alinear function in logistic regression; instead, the logistic regression function is used, which is the logit transformation of π.

$$\pi_i = \frac{\exp(\alpha_i + \beta_1 X_1 + \cdots + \beta_p X_p)}{1+\exp(\alpha_i + \beta_1 X_1 + \cdots + \beta_p X_p)} \quad (2)$$

Then the logit or log-odds of having pr(Y$\leq$ i) $\pi_i$ is modeled as a linear function of the explanatory variables as:

$$\log\left[\frac{pr(Y\leq i)}{1-pr(Y\leq)}\right] = \log\left[\frac{\pi_i}{1-\pi_i}\right] = \alpha_i + \beta_1 X_1 + \cdots + \beta_p X_p$$

Equivalent with$log\left[\frac{\pi_i}{1-\pi_i}\right] = \alpha_i + \sum_{j=1}^{p}\beta_j X_j; 0 \leq \pi_i \leq 1$; therefore

$$logit[pr(Y \leq i)] = \alpha_i + \sum_{j=1}^{p} \beta_j X_j; i = 1, \dots c-1 \; and \; j = 1, 2, \dots, p \quad (3)$$

The model assumes a linear relationship for each logit and parallel regression lines.Equation (3) is called proportional odds model and it estimates simultaneously multipleequations of cumulative probability.

Partial Proportional Odds Model

As the proportional odds assumption is difficult to achieve in practice, the PPOM may beused as an alternative. Partial proportional odds model can be classified as PPOM unrestricted and the restricted one.The unrestricted partial proportional odds model is used when proportional chanceassumption is not valid and the coefficients are associated with each category of theresponse variable (in the case of both parallel and linear assumption are not fulfilled).

The model has the form:

$$\tau_i = ln\left[\frac{pr\left(Y = \frac{1}{X}\right) + \cdots + pr(Y = \frac{i}{x})}{pr\left(Y = \frac{i+1}{X}\right) + \cdots + pr(Y = \frac{k}{X})}\right] = ln\left[\frac{\sum_{i=1}^{i} pr(Y = \frac{i}{X})}{\sum_{i+1}^{ik} pr(Y = \frac{i}{X})}\right] - - - \quad (4)$$

$$\tau_{i=\alpha_i} + \{\beta_1 + \gamma_{i1)} X_1 + \cdots + (\beta_q + \gamma_{iq}) X_q + (\beta_{q+1} X_{q+1}) + \beta_p X_p\}, i = 1, \dots k-1$$

When these restrictions are included this model is called the restricted partial proportional odds model. The $\tau$iparameters are fixed scale parameters which take the form of restrictions allocated to the parameters.

Odds Ratio

The odds ratio is a value which measures the strength of effect of each independent variablein the model on the log odds of the dependent variable.The odds of some event happening is defined as the ratio of the number of occurrences to the number of non-occurrences. That is, the odds of the event *E* are given by:

$$odds(E) = \frac{pr(E)}{pr(not\ E)} = \frac{pr(E)}{1 - pr(E)}$$

The odds of the response are multiplied by $e^{\beta}$for every unit increment of *x*. That is, the odds at level *x* + 1 equal the odds at *x* multiplied by $e^{\beta}$and odds less than one indicate the occurrence is less likely than non-occurrence.

Model Selection

It is much better to compare models based on theirresults, reasonableness and fit as measured, by the AkaikeInformation. AIC=-2(maximized log likelihood-number of parameters in model).This penalizes a model for having many parameters. With models for categorical *Y*, this ordering is equivalent to one based on an adjustment of the devianceby twice its residual degree of freedom (Agresti, 2002).

Test of Overall Model Fit

For the selected model we should look at an overall test of the null hypothesis that the location coefficients for all of the variables in the model are 0 before proceeding to examine the individual coefficients.

The change in likelihood function has a chi-square distribution even when there are cells with small observed and predicted counts. This value provides a measure of how well the model fits the data. The log likelihood statistic is analogous to the error sum of squares in multiple linear regressions

Goodness-of-Fit Measures

The structural form of the model describes the patterns of association and interaction. The sizes of the model parameters determine the strength and importance of the effects. Model's predicted values smooth the data and provide improved estimates of the mean of *Y* at possible explanatory variable values.

For logistic regression, the model coefficients are estimated by the maximum likelihood method. The ordinal logistic regression model is fitted to the observed responses using the maximum likelihood approach.

The parameters are estimated by maximizing the likelihood, or more usually, by maximizingthe logarithm of the likelihood. The likelihood function is given by the equation:

$$L = \prod_{j=1}^{n}\left[\prod_{i=1}^{c} \pi_i(X_j)^{\gamma_{ij}}\right] = \prod_{j=1}^{n}\left[\prod_{i=1}^{c}\left[\frac{exp(\alpha_i + \beta' X_j)}{1 + exp(\alpha_i + \beta' X_{j)}}\right] - (\frac{exp(\alpha_{i-1} + \beta' X_j}{1 + exp(\alpha_{i-1} + \beta' X_j}))^{\gamma_{ij}}\right]$$

He deviance is also used to construct a goodness-of-fit test for the model. The goodness of fit statistics for ordinal logistic regression has a form:

$$D = 2\sum\sum O_{ij}\log(\frac{O_{ij}}{E_{ij}})$$

Likewise, the Pearson chi-square statistic also compares the model fit to the actual data, defined

$x^2 = \sum\sum \frac{(O_{ij} - O_{ij})^2}{E_{ij}}$ ; $E_{ij}$ is the expected value for the i$^t$ observation.

Both goodness-of-fit statistics should be used only for models that have reasonably large expected values in each cell.

## 4. Results and Discussions

Table 1 describes varaiables significantly associated with level of understanding in the class which are identified based on chisquere test of asscociation. Forinstance, siginificance chisquare value 20.429, p-value < 0.05 which shows that there is a significance association between level of understanding and students gender group. Another important variables significantly associated with level of understanding in class when modular curriculum design applied were age, siginificance chisquare value 49.945, p-value < 0.05), Fathers education level, siginificance chisquare value 24.64, p-value < 0.05).

**Table 1:** Description of Varaiables Associated With for Level of Understanding of Students

| Variables | Ctegory | Level of Understanding % (frequncy) | | | | Total %(n) | $X^2$-square | Df | P_value |
|---|---|---|---|---|---|---|---|---|---|
| | | Very High | High | Moderate | Low | | | | |
| Sex | Female | 49.3(36) | 16.4(12) | 24.7(18) | 9.6(7) | 100(73) | 20.429 | 3 | 0.00 |
| | Male | 18.6(18) | 39.2(38) | 29.9(29) | 12.4(12) | 100(97) | | | |
| Age | 20-23 | 45.6(47) | 18.4(19) | 25.2(26) | 10.7(11) | 100(103) | 49.945 | 9 | 0.00 |
| | 24-26 | 6.3(2) | 71.9(23) | 18.8(6) | 3.1(1) | 100(32) | | | |
| | 27-30 | 13.0(3) | 21.7(5) | 47.8(11) | 17.4(4) | 100(23) | | | |
| | >=31 | 16.7(2) | 25.0(3) | 33.3(4) | 25.0(3) | 100(12) | | | |
| Fathers education | Uneducated | 34.7(17) | 30.6(15) | 28.6(14) | 6.1(3) | 100(49) | 24.637 | 9 | 0.003 |
| | Certificate | 35.7(15) | 40.5(17) | 21.4(9) | 2.4(1) | 100(42) | | | |
| | Diploma | 22.6(7) | 25.8(8) | 45.2(14) | 6.5(2) | 100(31) | | | |
| | Degree and above | 31.3(15) | 20.8(10) | 20.8(10) | 27.1(13) | 100(48) | | | |
| Frequency of Attending class | Always | 33.0(35) | 26.4(28) | 32.1(34) | 8.5(9) | 100(106) | 10.413 | 6 | 0.108 |
| | Sometimes | 29.4(10) | 26.5(9) | 20.6(7) | 23.5(8) | 100(34) | | | |
| | Usually | 30.0(9) | 43.3(13) | 20.0(6) | 6.7(2) | 100(30) | | | |
| Mode of course delivery | Semester | 49.3(36) | 16.4(12) | 24.7(18) | 9.6(7) | 100(73) | 20.429 | 3 | 0.00 |
| | Block | 18.6(18) | 39.2(38) | 29.9(29) | 12.4(12) | 100(97) | | | |
| Covering content | Strongly agree | 35.6(16) | 24.4(11) | 31.1(14) | 8.9(4) | 100(45) | 5.625 | 9 | 0.777 |
| | Agree | 33.7(29) | 32.6(28) | 22.1(19) | 11.6(10) | 100(86) | | | |
| | Disagree | 25.0(7) | 25.0(7) | 39.3(11) | 10.7(3) | 100(28) | | | |
| | Strongly disagree | 18.2(2) | 36.4(4) | 27.3(3) | 18.2(2) | 100(11) | | | |
| Plan of teachers on accademy | Strongly agree | 52.6(20) | 23.7(9) | 21.1(8) | 2.6(1) | 100(38) | 29.549 | 9 | 0.001 |
| | Agree | 28.8(19) | 34.8(23) | 27.3(18) | 9.1(6) | 100(66) | | | |
| | Disagree | 16.7(6) | 22.2(8) | 50.0(18) | 11.1(4) | 100(36) | | | |
| | Strogly disagree | 30.0(9) | 33.3(10) | 10.0(3) | 26.7(8) | 100(30) | | | |
| Time of study at home(H) | 1-3 | 27.1(16) | 23.7(14) | 33.9(20) | 15.3(9) | 100(59) | 10.355 | 9 | 0.323 |
| | 4-5 | 34.0(17) | 32.0(16) | 22.0(11) | 12.0(6) | 100(50) | | | |
| | 6-7 | 26.3(10) | 42.1(16) | 26.3(10) | 5.3(2) | 100(38) | | | |
| | more than 7 | 47.8(11) | 17.4(4) | 26.1(6) | 8.7(2) | 100(23) | | | |
| CGPA | 2.00-2.5 | 27.9(12) | 27.9(12) | 32.6(14) | 11.6(5) | 100(43) | 8.850 | 9 | 0.451 |
| | 2.55-3.00 | 36.7(29) | 26.6(21) | 29.1(23) | 7.6(6) | 100(79) | | | |
| | 3.15-3.5 | 38.5(10) | 30.8(8) | 15.4(4) | 15.4(4) | 100(26) | | | |
| | 3.55-4.00 | 13.6(3) | 40.9(9) | 27.3(6) | 18.2(4) | 100(22) | | | |
| Depar- tment | Ststistics | 25.7(9) | 20.0(7) | 42.9(15) | 11.4(4) | 100(35) | 26.356 | 21 | 0.193 |
| | Mathematics | 27.8(5) | 44.4(8) | 16.7(3) | 11.1(2) | 100(18) | | | |
| | Bio Tech | 37.0(10) | 14.8(4) | 37.0(10) | 11.1(3) | 100(27) | | | |
| | Geology | 56.3(9) | 25.0(4) | 18.7(3) | 0(0) | 100(16) | | | |
| | Biology | 23.5(4) | 41.2(7) | 29.4(5) | 5.9(1) | 100(17) | | | |
| | Chemistry | 50.0(8) | 31.3(5) | 6.3(1) | 12.5(2) | 100(16) | | | |
| | Sport | 33.3(4) | 33.3(4) | 25.0(3) | 8.3(1) | 100(12) | | | |
| | Physics | 17.2(5) | 37.9(11) | 24.1(7) | 20.7(6) | 100(29) | | | |

The research results will help in evaluating effectiveness of modularized curriculum in maintaining students understanding

level in Wolaiata Sodo University. By doing so, it will shed light on factors that contribute towards variation in understading level of students. The results had also important empirical and theoretical contributions to knowledge and strategies in curriculum design. This study is also timely in view of current government initiatives like Ministor of education and to concerned bodies of development and transformation of Ethiopia. It will help in the evaluation of modular based curriculum in national level.

**Table 2:** Parameter Estimates of Correlates of students Understanding Level.

| Variable Under Stdy | Response category | $\beta$ | S.E $\beta$ | Wald | Df | Sig | Exp ( $\beta$) | 95% CI $\beta$ | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Lo | Up |
| Undestanding level | Low | -1.704 | 0.128 | 177.3 | 1 | 0.000* | 0.181 | -1.955 | -1.453 |
| | High | -0.693 | 0.108 | 41.18 | 1 | 0.000* | 0.500 | -0.905 | -0.481 |
| Age | 20-25 | -0.556 | 0.098 | 32.201 | 1 | 0.010 | 0.574 | -0.575 | -0.364 |
| | 26-30 | -0.466 | 0.071 | 43.078 | 1 | 0.001 | 0.628 | -0.605 | -0.327 |
| | Above 30(Rf) | - | - | -- | - | - | - | - | - |
| Sex | Male | 0.153 | 0.049 | 9.75 | 1 | 0.007 | 1.164 | 0.057 | 0.249 |
| | Female ( Rf) | - | - | - | - | - | - | - | - |
| Residence | Urban | 2.72 | 0.656 | 17.167 | 1 | 0.000* | 15.180 | 1.433 | 4.006 |
| | Near to urban | 3.549 | 0.667 | 28.323 | 1 | 0.000* | 34.779 | 2.242 | 4.858 |
| | Rural | - | - | - | - | - | - | - | - |
| Employment status | employed | 0.325 | 0.022 | 218.23 | 1 | 0.000* | 1.384 | -0.368 | -0.282 |
| | Unemployed (Rf) | _ | | | - | - | - | - | - |
| Economic status( Parents) | Poor | -0.244 | 0.33 | 54.676 | 1 | 0.000* | 0.783 | -0.891 | 0.402 |
| | Medium | .069 | 0.022 | 9.81 | 1 | 0.002 | 1.071 | 0.026 | 0.112 |
| | Rich | - | - | - | - | - | - | - | - |
| Entrance Exam Results | 300-400 | -2.72 | 0.656 | 17.167 | 1 | 0.000* | 0.066 | -4.006 | -1.433 |
| | 401-500 | -3.549 | 0.667 | 28.323 | 1 | 0.000* | 0.0288 | -4.858 | -2.242 |
| | 500+(Rf) | - | - | - | - | - | - | - | - |
| Partners Education | Illiterate | -2.72 | 0.656 | 17.167 | 1 | 0.000* | 0.0659 | -4.006 | -1.433 |
| | Primary | -3.549 | 0.667 | 28.323 | 1 | 0.000* | 0.0288 | -4.858 | -2.242 |
| | 2ndary+ (Rf) | - | - | - | - | - | - | - | - |
| I have knlge for previous chapter when new begins. | No | 0.506 | 0.101 | 25.127 | 1 | 0.000* | 1.66 | 0.308 | 0.704 |
| | Yes(Rf) | | | | | | - | | |
| Time Spent in study at Home per a day | 6+ | 0.602 | 0.111 | 29.61 | 1 | 0.002 | 1.83 | 0.384 | 0.82 |
| | 3-5 | 0.072 | 0.023 | 10.04 | 1 | 0.000* | 1.08 | 0.027 | 0.117 |
| | 1-2(Rf) | - | - | - | - | - | - | - | - |
| Modularization is good | Yes | 1.134 | 0.25 | 20.57 | 1 | 0.004 | 3.110 | 0.64 | 1.62 |
| | No (Rf) | - | - | - | - | - | - | - | - |
| -2Log likelihood | | | Chi-square((p-value) | | | | | | |
| 981.98 | | | 552.51((0.000)) | | | | | | |

From the Table 1, we see that the deviance based chi-square value, $x^2 = \sum\sum \frac{(O_{ij} - O_{ij})^2}{E_{ij}}$; is equal to 552.51 (pvalue=0.000) for model. This is an indication that model fits the data well. Moreover, the computed values for the Pearson and deviance test statistics were found to be significant for the models. Akaike Information Criteria (AIC) and Bayesian Information Criteria (BIC) were among the most commonly used statistics in the selection. The 2log likelihood for model is 981.98. The results indicated that residence, age, sex, Entrance exam results, course delivery methods, partner's education,parents economic status and attitude towards modularization were found to be statistically significant correlates to university students understanding level in a class where modurared curriculum is applied. The adjusted odds ratio for residence (OR) [exp (2.72)=15.18] indicates that students from urban areas were 15.18 times more likely to understand compared to students from rural areas. The adjusted odds ratio for residence (OR) [exp(3.55)=34.78] indicates that students from near to urban areas were 34.78 times more likely to understand compared to individuals from rural areas.

Time Spent in study at home per a day was also significantly related with the dependent variable in this study. Comparing students in the class, students who spends more than 6 hour to study at home were 1.83 times more likely to understand than those students who spends less than 2 hours to study at home per a day.

The current study showed that parent's employment status is also significant covariate. The adjusted odds ratio [exp (0.325)=1.384] indicates that students who come from employed parents were 1.384 times more likely to understand as compared to those students who come from unemployed parents.

## 5. Conclusions and Recommendations

This study is an attempt to evaluate of modular approach of curriculum on students understanding level and academic performance in Wolaiata Spodo University, Natural and computational science college. The finding shows that the student's level of understanding and academic performance obtained from modular based is good.

Eventhough modular based approach is good, there are some demographic, and socioeconomic variables that hinders students understanding level when modular based approach is applied in curriculum. The findings indicated that level of understanding of students was significantly association with variables: Gender, Age, parent's education level and Plan of teacher on the accademy. Finally the results reveled that students perform better regarding commulative grade point when applay modular based approach of curriculum. Additionally, students take more time with their study to score better grade when we apply modular based approach of curriculum design.

Empirical and theoretical findings obtained from this study will contribute in evaluating modular based approach of curriculum on student's capacity building in Wolaita Sodo University, College of Natural and Computatinal Science College.

In addition to this it will help in the formulation of national and local curriculum design that is appropriate for science course understanding. Generally, modular based curriculum design improves student performance, the classroom activity and involvement of students in their day to day teaching learning activities, which in turn improves the uncerstanding level of students. And reseaercher recommends from the findings that, critical affirmative action should be undertaken for female students, students with less academic records in university entrance exam, students who come from low income parents, students who come from illiterate family, and students of age group less than 25.

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