



EXPLORING THE DIRECT AND INDIRECT EFFECTS BETWEEN DEPENDENT AND INDEPENDENT VARIABLE USING REGRESSION ANALYSIS AND PATH ANALYSIS IN RESPECT OF SELF CONFIDENCE AND ANXIETY IN ENGLISH LANGUAGE ON ATTITUDE TOWARDS ENGLISH LANGUAGE

Siddaraju K.S.¹ & Jayamma H. R.², Ph. D.

¹Research Scholar, P.G. Department of Education, Bangalore University, Bangalore

²Professor and Chairperson, P.G. Department of Education, Bangalore University, Bangalore

Abstract

The present study is aimed to analyse the relationship between dependent variable and independent variable. The present study involves statistical techniques i.e. Regression Analysis and Path Analysis. Self confidence and anxiety in English language are independent variables, whereas the Attitude towards English is dependent variable. The present study reveals that each time the regression equation for the sample is used to predict attitude towards English language of students of secondary schools. Similarly, the Anxiety in English language contributes inversely or negatively on attitude towards English language of students of secondary schools than Self confidence. Whereas, in path analysis Self confidence and Anxiety in English are directly and inversely affecting the attitude towards English language respectively.



Scholarly Research Journal's is licensed Based on a work at www.srjis.com

CONCEPT OF REGRESSION AND PATH ANALYSIS

Regression is the statistical tool with the help of which one can predict the unknown values of one variable from known values of other variables. Regression analysis is concerned with the deviation of an appropriate mathematical expression of the functional relationship between variables.

Path analysis is a multivariate technique which provides possibilities for causal determinations among sets of measured variables. It is a technique using standardized multiple regression equations in examining a theoretical model. Using path analysis, it is possible to postulate the relationships, the extent of relationships and the direction of relationships. Hence, for a predictive extent of determination, path analysis was conceived and tested in the present study (Miller, 1991).

THEORETICAL ASSUMPTIONS OF REGRESSION & PATH ANALYSIS

Regression analysis expression is derived for the purpose predicting the values of a dependent variable on the basis of independent variables. Regression analysis is thus, designed to examine the relationship of a variable Y to a set of other variables $X_1, X_2, X_3, \dots, X_n$.

The relationship between dependent variable (Y) and the independent variables (X) can be studied through mathematical formulae. The most commonly used linear equation is $Y = b_1X_1 + b_2X_2 + \dots + b_nX_n + b_0$

Here Y the dependent variable is to be predicted, $X_1, X_2, X_3, \dots, X_n$ are the known variables with which prediction are to be made and b_1, b_2, \dots, b_n are the regression coefficients of $X_1, X_2, X_3, \dots, X_n$ variables that are determined from the observed data and b_0 is the constant (Y intercept).

The present study, the attitude towards English language of students of secondary schools (Y) is considered as dependent variable. There are two variables were taken as the independent variables i.e. Anxiety in English language (X_1) and Self Confidence (X_2).

Therefore, the multiple linear regression model becomes

$$Y = b_0 + b_1X_1 + b_2X_2$$

Where,

X_1 = Anxiety in English language

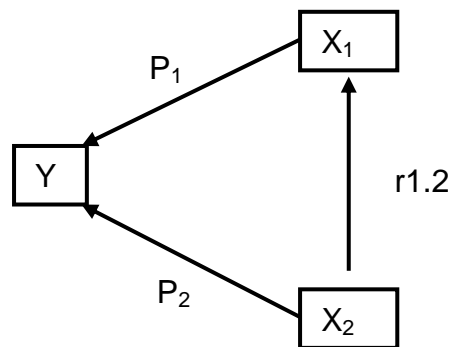
X_2 = Self Confidence

In simple, the multiple regression analysis, empathises was on the study of the extent to which the dependent variable(s) get affected by the contribution of the independent variable(s) on original scales measurements being standardized for comparison of the scores with the studies being carried out by others with the same variables(s). The regression coefficients obtained carrying out simple, multiple regression analysis were found to get affected by the unit of measurement. In other words, the values of the regression coefficients of the variables get affected with the change of unit of measurement of the variable(s). In order to understand the true relation between the dependent and independent variables it becomes necessary to have regression coefficients independent of the unit of measurement of the variables. The regression coefficients are directional in the sense that they indicate the direction of the direction in the form of independent variable as the cause of the corresponding dependent variable. Thus, the regression coefficients in the regression models of the standardized variables have come to be named path (directional) coefficients, with the

path (direction) being from an independent variable towards the corresponding dependent variable. Hence the regression analysis carried out with the help of standardized variables has come to be known as path analysis. It is worth nothing that, one value of the path coefficients as regression coefficients of the standardized variables, are the same in their values as those of the corresponding correlation coefficients. In the magnitude, the path coefficients are directional, but correlation coefficients are not directional. Though, both are independent of the units of measurement of the corresponding variables.

Added advantage of path analysis over multiple linear regression analysis is that of finding the direct and indirect effects of the independent variables on the corresponding dependent variable. In general, a variable can have its effect being revealed by the magnitude and the direction of the path coefficient of the independent variable. It can also have an effect on the dependent variable by the virtue of its relation with another independent variable. Thus, the effect of an independent variable on a dependent variable as received by the path coefficient of the independent variable is known as direct effect of the independent variable. On the other hand, the effect of an independent variable through another variable is termed as indirect effect of the independent variable on the dependent variable.

Figure-1: Direct and Indirect paths



In the above figure, P_1 is the direct effect of X_1 on Y , $r_{1.2}$, P_1 is the indirect effect of X_1 on Y through X_2 and P_2 is direct effect of X_2 on Y .

A variable not exerting direct effect on the dependent variable may exert indirect effect on the dependent variable through an independent variable. Such a phenomena holds good in many situations.

OBJECTIVES OF THE STUDY

1. To study the self confidence and anxiety in English language are significant predictors of attitude towards English language of students of secondary schools.

2. To study the direct and indirect effect of self confidence and anxiety in English language on attitude towards English language of students of secondary schools.

DATA ANALYSIS AND RESULTS

Regression Analysis

Hypothesis-1: Self confidence and Anxiety in English language would not be significant predictors of attitude towards English language of students of secondary schools.

To achieve this hypothesis, the multiple linear regression analysis was performed and the results are presented in the following table.

Table-1: Results of Multiple Linear Regression of Attitude towards English Language by Self Confidence and Anxiety in English Language of Students of Secondary Schools

Independent Variables	Regression Coefficient	SE of Reg. Coefficient	t-value	p-level	Signi.
Intercept	129.0839	6.3187	20.4289	<0.05	S
Anxiety in English Language (X ₁)	-0.2695	0.0429	-6.2847	<0.05	S
Self Confidence (X ₂)	0.1346	0.0266	5.0612	<0.05	S

R=0.6911, R²=0.4776, F(2,497)=227.24 p<0.05, S, Std.Error of estimate: 6.0394

From the results of the above table, it can be seen that,

- The combined effect of Anxiety in English language (X₁) on attitude towards English language students of secondary schools is found to be negative and statistically significant at 0.05 level of significance. It means that, the attitude towards English language students of secondary schools is influenced by Anxiety in English language (X₁).
- The combined effect of Self confidence (X₂) on attitude towards English language of students of secondary schools is found to be positive and statistically significant at 0.05 level of significance. It means that, the attitude towards English language of students of secondary schools is influenced by Self confidence (X₂).

Therefore, the multiple linear regression equation of attitude towards English language of students of secondary schools (Y) in terms of Anxiety in English language (X₁) and Self confidence (X₂) was found to be under:

$$\text{Attitude towards learning English language (Y)} = 129.0839 - 0.2695X_1 + 0.1346X_2$$

The multiple R of the linear regression equation is 0.6911. For testing multiple correlation coefficient, the F-ratio (227.24) was found to be significant at 0.05. Thus, the null hypothesis is rejected and alternative hypothesis is accepted. Significant R suggests that estimation of attitude towards English language of students of secondary schools is possible

on the basis of the predictor's i.e. of Anxiety in English language (X_1) and Self confidence (X_2). Further, the regression equation shows that of Anxiety in English language (X_1) and Self confidence (X_2) can be used for the prediction of attitude towards English language of students of secondary schools.

The coefficient of multiple determination of R^2 is 0.4776. It can observed and found that nearly 47.76 percent of the variation in attitude towards English language of students of secondary schools for whatever is measured by Anxiety in English language (X_1) and Self confidence (X_2) taken together. The SE_{est} for the regression equation is 6.0394. This means that each time the regression equation for the sample is used to predict attitude towards English language of students of secondary schools by ± 6.0394 .

The relative contributions of independent variables i.e. Anxiety in English language (X_1) and Self confidence (X_2) on attitude towards English language of students of secondary schools in terms of proportions of variance predicted by each were determined which are given in the following table.

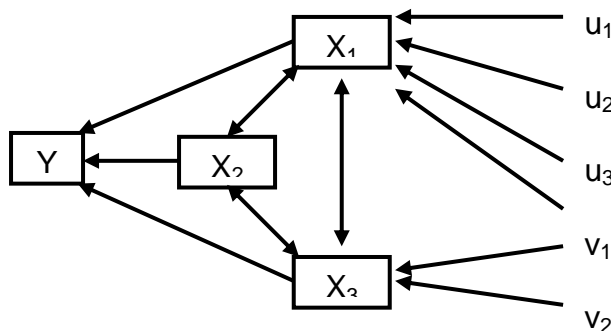
Table-2: Relative Contribution of Self Confidence and Anxiety in English Language on Attitude towards English Language of Students of Secondary Schools

Independent Variables	Beta Value	r-value	Beta \times r	% of Contribution
Anxiety in English Language (X_1)	-0.3970	-0.6714	0.27	26.65
Self Confidence (X_2)	0.3197	0.6604	0.21	21.11
Total			0.48	47.77

The evident from the above table that 47.77 percent of variance in the criterion variable is accounted for by variance, in which 26.65 percent in the variable Anxiety in English language (X_1) and 21.11 percent in the variable Self confidence (X_2) on attitude towards English language of students of secondary schools. Thus, it seems that the Anxiety in English language (X_1) contributes inversely or negatively on attitude towards English language of students of secondary schools than Self confidence (X_2).

Path Analysis

Figure-2: Indirect paths through intermediately variables



In the above figure X_1 , X_2 , and X_3 are the independent variables each having direct effect as well as indirect effect on the dependent variables Y . The variables u_1 , u_2 , u_3 , v_1 , and v_2 are also the independent variables with only indirect effect on Y through some or all of the independent variables X_1 , X_2 , and X_3 as indicated in figure-1. In such situations the variables X_1 , X_2 , and X_3 are called the intermediately variables between Y and u_1 , u_2 , u_3 , v_1 , and v_2 .

From the above narration it is evident that a variable can have only direct effect, only indirect effect and both direct and indirect effects on a dependent variable or variables.

The details of selected significant direct and indirect of independent variables i.e. anxiety in English language and self confidence with their interrelations is given in the following table and diagram:

Hypothesis-2: There is no significant direct and indirect effect of self confidence and anxiety in English language on attitude towards English language of students of secondary schools.

To achieve this hypothesis, the path analysis was performed and the results are presented in the following table.

Table-3: Results of Direct and Indirect Effect of Self Confidence and Anxiety in English Language on Attitude towards English Language of Students of Secondary Schools

Independent Variables	Direct Effects	Indirect Effects Through	
		X_1	X_2
Anxiety in English Language (X_1)	-0.2695*	-	-1.3834*
Self Confidence (X_2)	0.1346*	-0.5324*	-

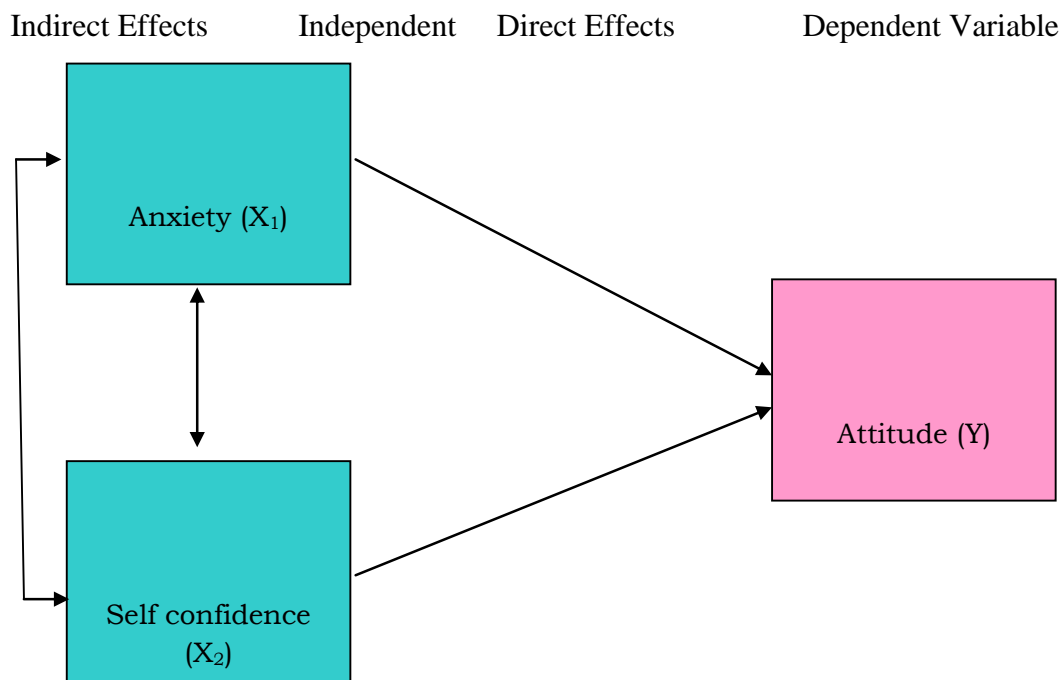
* $p < 0.05$

From the results of the above table, it can be seen that,

1. The direct effect of Anxiety in English language (X_1) on attitude towards English language of students of secondary schools is found to be negative and statistically significant at 0.05 level of significance. It means that, the Anxiety in English language (X_1) is directly affecting on attitude towards English language of students of secondary schools.
2. The direct effect of Self confidence (X_2) on attitude towards English language of students of secondary schools is found to be positive and statistically significant at 0.05 level of significance. It means that, the Self confidence (X_2) is directly affecting on attitude towards English language of students of secondary schools.

3. The indirect effect of Anxiety in English language (X_1) through Self confidence (X_2) on attitude towards English language of students of secondary schools is found to be statistically significant at 0.05 level of significance.
4. The indirect effect of Self confidence (X_2) through Anxiety in English language (X_1) on attitude towards English language of students of secondary schools is found to be statistically significant. The direct and indirect effects of anxiety in English language and self confidence on attitude towards English language of students of secondary schools are presented in the following figure.

Figure-3: The Direct and Indirect Effect of Self Confidence and Anxiety in English Language on Attitude towards English Language of Students of Secondary Schools



FINDINGS OF THE STUDY

- The attitude towards English language students of secondary schools is influenced by Anxiety in English language (X_1).
- The attitude towards English language of students of secondary schools is influenced by Self confidence (X_2).
- The multiple linear regression equation of attitude towards English language of students of secondary schools (Y) in terms of Anxiety in English language (X_1) and Self confidence

(X_2) was found to be under: Attitude towards learning English language (Y) = $129.0839 - 0.2695X_1 + 0.1346X_2$

- The Anxiety in English language (X_1) contributes inversely or negatively on attitude towards English language of students of secondary schools than Self confidence (X_2).
- The Anxiety in English language (X_1) is directly affecting on attitude towards English language of students of secondary schools.
- It means that, the Self confidence (X_2) is directly affecting on attitude towards English language of students of secondary schools.

Conclusion

Regression analysis is concerned with the deviation of an appropriate mathematical expression of the functional relationship between variables. Regression analysis is designed to examine the relationship of a variable Y to a set of other variables $X_1, X_2, X_3, \dots, X_n$.

The relationship between dependent variable (Y) and the independent variables (X) can be studied through mathematical formulae. The most commonly used linear equation is $Y = b_1X_1 + b_2X_2 + \dots + b_nX_n + b_0$

Path analysis with all the variables being standardized has provided clear picture of direct and indirect effects of independent variables on dependent variables. The corresponding regression analysis gets masked due to the dependent and independent variables not being standardized. Moreover, in the case of regression analysis it is not possible to know the extent of indirect effect of a variable on another variable through a third variable. Hence, the importance of multiple and multivariate path analysis over multiple and multivariate regression analysis. Moreover, path analysis provides basis for comparison of findings of similar studies.

References

- Bishop, Y.M.M., Feinberg, S.E. and Holland, P.W. (1975) *Discrete Multivariate Analysis : Theory and Practice*. Cambridge, Mass : MIT Press.
- Bock, R.D. (1975) *Multivariate Statistical Methods in Behavioural Research*. New York : McGraw-Hill.
- Bock, R.D. and Brandt, D. (1980) *Comparison of Some Computer Programs for Univariate and Multivariate Analysis of Variance*. In P. B. Krishnaiah (Ed.) *Handbook of Statistics (Vol. 1)*. Amsterdam : North Holland.
- Dubios, P. H. (1965) *An Introduction to Psychological Statistics*. New York: Harper and Row.
- Duncan, O.C. (1966) *Path Analysis : Sociological Examples*. *American Journal of Sociology*. Vol. 72, 1-66.

- Heise, D.R. (1969) *Problems in Path Analysis and Causal Inference*. In E.F. Borgatta (Ed.) *Sociological Methodology*. San Francisco : Jossey-Bass, 81-117.
- Mitzel, H.E. (Ed.) (1982) *Encyclopedia of Educational Research*. (5th Ed.), Vol. 3, London : The Free Press, Collier Macmillan Publishers.
- Snedecor, G.W. and Cochran, W.G. (1975) *Statistical Methods*. New Delhi: Oxford and IBH Publishing Co.
- Wolfle, L.M. (1980) *Strategies of Path Analysis*. *American Educational Research Journal*. Vol. 17, 183-209.