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The predictive validity of the reading ability test (HL) "Diagnostic evaluation of admission to high school"

Education

KEYWORDS: validity, prediction, instrument and baccalauréat

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ABSTRACT

The development and outcome of the research work presented here was carried out at the College of Scientific and Technological Studies of the State of Durango (CECyTED), Mexico and aimed to measure the predictive validity of the reading ability test (HL), part that corresponds to the "Instrument of diagnostic evaluation of the entrance to the baccalaureate". To achieve the objective, the multiple linear regression method was used by applying the ANOVA tests, "t" test and the R2 statistic; with the support of the Excel spreadsheet and the SPSS statistical program in its version 22. The obtained results confirmed a collinearity problem between the PyTdeT and ByMdelaI modules, to determine the cause of the problem the IVF test was performed, thus confirming the Linear dependence of these two independent variables.

Introduction

To evaluate the students who enter middle school in Mexico, an instrument is applied that measures the development of different skills, including reading. In the previous results of predictive validity of the instrument, it was observed that the score variable of the reading ability test (PTHL) is not predictive of the average secondary score of the participants (PPROMS), nor is it for the average partial score of (PPROMPB), which means that there is a problem of validity of the HL test. Therefore, the objective of this research is to measure the predictive validity of the reading ability test (HL). This research work is considered important because with the results obtained it is possible to value with greater certainty the results derived from its application, while being able to make a judgment about its contribution to the determination and development of the student's abilities.

He validation and reliability process was based on the studies of Rodríguez and Valldeoriola (2009) since they mention that regardless of the area being evaluated or the use made of the results, all the procedures used must have certain credibility characteristics , Among the most essential are validity and reliability. "Validity refers to the homogeneity, to the correspondence between the instrument or technique and the attribute that the instrument intends to measure." (Rodríguez and Valldeoriola, 2009: 39)

In 2004, the Council of the National System of Technological Education (COSNET) paid special attention to the process of evaluation, accreditation and certification of learning. Therefore, "the assessment of learning is carried out in accordance with common standards for the entire system of Higher-level technological education, and the instruments applied on campus are equivalent "(p.36).

The method

This research is of an instrumental nature since in this category "... all studies aimed at the development of tests and apparatus, including both the design (or adaptation) and the study of the psychometric properties of the same are considered" (Montero and León, 2005, quoted by Barraza, 2010)

As for the validity property of a test, Pallares (1981) states that:
"Validity is the most important attribute that the test must have. It is a loss of energy when applying a test if it is not valid, if it does not measure what we intend to measure. Validity is, however, a relative term; a test is not valid in itself, it is valid to measure something". (p.11)

The validity measure of the HL test was performed with the application of the multiple linear regression method.

The statistical model that allows to obtain a predictive model for the criterion, which is optimal in some sense, that selects the important variables and considers them differentially according to their importance for the prediction of the criterion, is that of the Multiple Linear Regression, which estimates the mean Of Y conditional to a set of values in the predictor variables, ie: μ(x1....xp), after selecting the best set. (Martínez, 1996: 424)

The sample

The study was carried out with 34 students and their selection was deterministic; In this sense, Babbie (2000) states that: "... in many research situations probabilistic sampling is impossible or inadequate, and non-probabilistic sampling techniques are more convenient" (pp. 173, 174)

Multiple Linear Regression Tests. The information used was the sum of the difference of the scores of the modules: Syntactic and Semantic Aspects (ASyS), Properties and Text Types (PyTdeT) and Information Search and Management (ByMdeI).

The evaluation of results in the application of the regression method was performed according to the following hypotheses:

An inferential test to evaluate the linear regression model is performed through the ANOVA hypothesis test, the purpose is to verify if the predictor variable provides information in the explanation of the dependent variable; the approach of the regression model and the hypothesis test is as follows:

$Y = a + bx + e$

$H_o = \beta_o$

$H_i \neq \beta_o$

H_o: there is no association between the two variables by linear regression
H_1: there is an association between the two variables by linear regression

The rule of decision is:
If value "p" <α, reject H_o

A second inferential test that considers the values of the coefficients of the model is the hypothesis test using the regression coefficient through the "t" test; the contrast is as follows:

$H_o = 0$

$H_i \neq 0$

H_o: the predictor variable does not provide significant information in the regression analysis
H_1: the predictor variable provides significant information in the

regression analysis
The rule of decision is:
If value "p" <α, reject H_o

The third test consists of determining the coefficient of determination R2, which reflects the variation of the dependent variable originated by the criterion variable.

The hypothesis test was performed using the regression parameters of the following model:
Y = a + b_1 x_1 + b_2 x_2 + ··· + bnXn
H_0: 〖B〗 _i = 0
H_0: 〖B〗 _I ≠

Results

Table 1 shows the results of the regression test of the HL knowledge areas; in them it is observed that only the independent variable PyTdeT explains the behavior of the PRTHL and it does so in a percentage of 61.4.

When reviewing the results obtained in this last table, it was observed that the independent variables ASyS and ByMdeI did not provide significant information, so it was assumed that there was a collinearity problem between the three variables; to clear doubts and clarify their behavior in the model it was decided to perform the corresponding test.

Table No. 1. Results of the regression test

Variables: PRTHL=C+B_1 ASyS+B_2 PyTdeT+B_3 ByMdeI						
statistical "F"	Critical value	value "p"	relationship	Value α	Decisión	Result
15.36	2.93	.000	<	.05	rechazar Ho	There is an association
statistical "t"	Critical value	value "p"	relationship	Value α	Decisión	Result
-.828		.415	>	.05	aceptar Ho	does not influence
3.142		.004	<	.05	rechazar Ho	influences
1.768		.088	>	.05	aceptar Ho	does not influence
statistical "R^2"						Result
.614	PyTdeT Explains the variation of HL in a 61.4%					Explain
equation	Y=5.642-.744x_1+.695x_2+.675x_3					

He first step was to check the correlation between the variables; In Table 2 (see Table 2), it can be seen that there is only a correlation between PyTdeT and ByMdelaI, which is why the ASyS variable was excluded from the test, in addition to being a module with only one reagent.

Table No. 2 Correlation test of HL

Correlacions				
		Reading Ability Semantic and Syntactic Skills	Reader Skills Properties and types of texts	Reading Skills Search and Management of Information
Habilidad Lectora Aspectos Sintácticos y Semánticos	Pearson´s	1	.128	.025
	Sig. (bilateral)		.478	.888
	N	33	33	33
Reading Ability Properties and Text Types	Correlación	.128	1	.732**
	Sig. (bilateral)	.478		.000
	N	33	33	33
Ability to Read and Manage Information	Pearson´s	.025	.732**	1
	Sig. (bilateral)	.888	.000	
	N	33	33	33
**. The correlation is significant at the 0, 01 level (2 tails).				

The second step consisted in determining the possible existence of linear dependence between the variables PyTdeT and ByMdelaI, for which we used the measure of the inflation factor of the variance (IVF); the result obtained is in table number 3, in it is seen that the two variables provide the same proportion of variance so that one of the two is over; at this moment the regression model is as follows:

Table No. 3. Measurement of IVF

Coefficients a								
Model		Non-standardized coefficients		Standardized coefficients	t	Sig.	Colinearity statistics	
		B	Standard	Beta			Tolera	VIF
1	(Constant)	4.957	1.711		2.897	.007		
	Reading ability, properties and types of texts	.666	.217	.516	3.065	.005	.464	2.155
	Reading ability, search and information management	.707	.378	.315	1.871	.071	.464	2.155
a. Dependent variable: score test reading ability								

In order to decide which of the two variables would be eliminated from the model to reduce the variance factor, the collinearity diagnoses found in table number 4, were reviewed and the decision was made to eliminate the ByMdelaI because for this field the dimensions 2 And 3 provide more variance; In these conditions the model is defined by the following algebraic expression: PRTHL = C + B_2 PyTdeT

Table 4. Diagnosis of collinearity.

Diagnosis of collinearitya						
Model	Dimension	Eigenvalue	Condition index	Proportions of variance		
				(Constant)	Ability to read properties and types	Reading ability, search and
1	1	2.849	1.000	.02	.01	.01
	2	.105	5.197	.95	.07	.19
	3	.046	7.900	.03	.92	.80
a. Dependent variable. Score test reading ability						

With the remaining variables regression was performed again, and IVF decreased by an approximate 53.6%, confirming the linear dependence of the independent variables; the result can be seen in the following table:

Table No. 5. IVF change.

Coefficientsa								
Model		Non-standardized coefficients		Standardize	t	Sig.	Colinearity statistics	
		B	Standard error	Beta			Tolerance	VIF
1	(Constant)	5.765	1.721		3.350	.002		
	Ability to read properties and types of texts	.964	.154	.747	6.262	.000	1.000	1.000
a. Dependent variable: score retest reading ability								

Finally, in table number 6, the summary of the updated model is presented, in which it can be seen that the only independent variable explains in 55.9% the behavior of the dependent variable.

Table 6. Summary of the final regression model.

Summary of the model				
Model	R	R square	R squared squared	Standard error of estimate
1	.747a	.559	.544	3.972

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a.Predictors: (Constant), Reading Ability Properties and Text Types

Conclusions

In the result of the first multiple linear regression test that was performed to evaluate the predictive validity of the HL test, it was recorded that only the independent variable PyTdeT explains the behavior of the PRTHL and does so in a percentage of 61.4, indicative value also Of their degree of validity.

The reason for this low level of validity and with support in the various tests carried out was mainly due to the problem of collinearity between the PyTdeT and ByMdelaI fields, since the first one explains 55.9% the behavior of the dependent variable.

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