

Aplicación del Punto de Umbral en la Educación no
Presencial y la Educación Convencional, en el caso de la
Carrera de Licenciado Agropecuario

*Application of the Threshold Point in Non-Presential Education and
Conventional Education, in the case of Bachelor of Science in Agriculture*

*Aplicação limiar Point em não Presencial Educação convencional e Educação,
no caso de Agrícola graduada da carreira*

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Claudio Rafael Vásquez Martínez

Universidad de Guadalajara, México

crvasquezm@gmail.com

Felipe Anastacio González González

Universidad Autónoma de Tamaulipas, México

felgonzale@docentes.uat.edu.mx

Erik Moisés Betancourt Núñez

Universidad Autónoma de Tamaulipas, México

ebetan@docentes.uat.edu.mx

Sergio Esteban Rodríguez Ramírez

Universidad Autónoma de Tamaulipas, México

sergiordz-13@outlook.com

Joaquín Torres Mata

Universidad Autónoma de Tamaulipas, México

jtorresma@uat.edu.mx

Resumen

Las Instituciones de Educación Superior, tanto públicas como privadas, procuran llevar a cabo una política universitaria que trata de remediar dificultades académicas, administrativas, docentes y económicas, rechazan el procedimiento de aquellas condiciones que explican tales adversidades. En el mejor de los casos, se observan dificultades demasiados concretas, como la falta tradicional de elementos y equipo, la escasa formación del personal de ciertos niveles administrativos, la incongruencia de locales, elaboración de módulos, presentación de asesorías, y obviamente se establece una relación directa entre la magnitud de estas dificultades y la carencia de recursos financieros. Este estudio aplicó la técnica "Punto de Umbral", de los Valores en Educación No Presencial y Educación Convencional en Instituciones de Educación Superior. El estudio presenta la relación de Valores Fijos y Valores Variables además de la influencia que tiene el número de alumnos en el Valor Total Semestral por Programa, en el caso concreto de la Carrera de Licenciado Agropecuario. Concluyendo que la educación no presencial es menos costosa que la educación convencional.

Palabras clave: Técnicas comparativas, Educación presencial, Educación no presencial, Punto de Umbral.

Abstract

Institutions of Higher Education, both public and private, seek to carry out a University policy that tries to remedy difficulties academic, administrative, educational and economic, reject the procedure of those conditions that explain such adversities. In the best of cases, difficulties can be seen too many concrete, as the traditional lack of elements and equipment, poor training of staff of certain administrative levels, the incongruity of premises, preparation of modules, presentation of consultants, and obviously establishes a direct relationship between the magnitude of these problems and the lack of financial resources. This study applied the technique "Threshold Point" of values in Distance Education and Conventional Education in Institutions of Higher Education. The study presents the relationship of Fixed and Variable Values as well as the influence that has the number of students in the half-yearly total by program, in the case of the Bachelor of

Science in Agriculture. Concluding that the Distance Education is less expensive than Conventional Education.

Key words: Comparative techniques, Face-to-face education, Distance education, Threshold point.

Resumo

Instituições de Ensino Superior, públicas e privadas, visam a prossecução de uma política universitário que tenta remediar dificuldades acadêmicas, administrativas, educacionais e econômicas, rejeitar as condições de processo que explicam tais adversidades. No melhor dos casos, muitas dificuldades específicas, como a tradicional falta de elementos e equipamentos, má formação de determinados níveis administrativos, a incongruência de edifícios, o desenvolvimento de módulos, apresentação de conselho são observadas e, obviamente, estabelece um relação directa entre a magnitude dessas dificuldades e da falta de recursos financeiros. Este estudo aplicou a técnica de "ponto crítico" de valores em distnace Educação e Educação convencional em Instituições de Ensino Superior. O estudo apresenta os Securities relação fixa e valores variáveis, além da influência do número de alunos no valor Semestre Programa total no caso de Pós-Graduação Agrícola Race. Concluindo que a educação não-face é menos onerosa do que a educação convencional.

Palavras-chave: técnicas comparativas, educação em sala de aula, Educação distnace, ponto crítico.

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Background

The Colombian Institute for the Promotion of Higher Education (ICFES by its name in Spanish, 2006) processed a methodology for the determination of the University values to the necessity of having a functional tool that allowed advance studies of value and establish mechanism capable of producing information systemized, useful for processing theories and policies on Higher Education.

The final report of the study Deschooled University (Grove, 2006), presents six models of value in Distance education that are: period of recovery of the capital in accordance with books, internal rate of return, contribution to the net current cost, equivalent annual cost and cost of Schneider-Sigelen. All theoretically applied to Distance Education, without any adjustments to the system of values of the University of Antioch and without taking into account the Traditional Education.

Object of study

The object of this study is the application of the technique "Threshold Point" of values in Distance education (ENP) and Traditional Education (EC) in the Bachelor of Science in Agriculture. The study presents the relationship of Fixed and Variable Values, and power that are the number of pupils in the half-yearly total Value in the Bachelor of Science in Agriculture, Faculty of Education, University of Antioch during the the periods A to I (1990-2007).

Objectives

- Specify the Fixed Value, the Variable Value and the bi-annual Total Value of the Bachelor of Science in Agriculture.
- By the "Threshold point" technique to make comparison of the values mentioned above, between Distance Education (ENP) and Traditional education (EC) in the Bachelor of Science in Agriculture program.

Hypothesis

The values in Distance Education (ENP by its name in Spanish) of the Bachelor of Science in Agriculture are lower than in Traditional Education (EC by its name in Spanish).

Investigation questions

What is the fixed value in Non-Presential Education (ENP) of the Degree of Agricultural License and in Conventional Education (EC) of the Race of Agricultural License?

What is the variable value in Non-Presential Education (ENP) of the Graduate Degree in Agriculture and in Conventional Education (EC) of the Graduate Degree in Agricultural and Livestock?

What is the "Threshold Point" in Non-Presential Education (ENP) of the Agricultural Graduate Degree Course and in Conventional Education (EC) of the Agricultural Graduate Degree?

Justification

In many public and private higher education institutions, many financial policies are not known to remedy academic, administrative, educational and economic difficulties. It is necessary to study the university values with their respective conditions of fixed values, variables and total values, in order to differentiate in each administrative process what is being implemented. In the best of cases, too specific difficulties are known such as the traditional lack of elements and equipment, the lack of training of staff at certain administrative levels, the inconsistency of premises, the development of modules, the presentation of advisory services, and a direct relationship is established Between the magnitude of these difficulties and the lack of financial resources. For this reason, this study emphasizes the search for the "Point of Threshold" (PU) in Non-Presential Education (ENP) of the Degree of Agricultural Degree in Conventional Education (EC) of the Graduate Degree in Agriculture.

Review of Critical Values Factors in Non-Presential Education (ENP) and Conventional Education (CE)

Values in Non-Presential Education (ENP) and in Conventional Education (EC)

Social values

Values studies observe that, on a global scale, the time has passed when the award of public funds for education had the highest priority (Snowden and Daniel, 2009, Black 2001, Hirt, 2012).

It was in the 1990s that there was a greater concern about determining the allocation of resources in the field of education and when economists studied more intensely educational values (Krawitz, 2015, Otley, 2014, Streeck, 2005). At the same time, there is a willingness to substitute the labor force for capital goods. The labor force in traditional education represents the highest level of values, reaching 80% and 90% percentages of wages. And not only that, increases in labor force values have an impact on other output values (Barr, 2011, Knorr, 2004, White, 2001).

In Conventional Education (EC), teacher salaries represent the largest component of total values. On the contrary, it has been determined that in the Non-Presential Education (ENP) the three most important factors in this respect are: "Multimedial System", "Curricular Organization" and "Number of students" (Morrill, 2007; Mackinnon, 2014; Levin, 2015).

Curriculum Organization

The broader and more varied the range of courses offered by a model of Non-Presential Education (ENP), the greater the values that its production and maintenance generate (Shah, 2005; Tarba, 2017; Frees, 2014).

Number of students

With regard to what happens in the Conventional Education (EC), in which a greater number of students necessarily involves the hiring of more teachers, in Non-Presential Education (ENP) this variable is the one that allows, once reached a The critical increase in the number of students increases the average value per student (Sulej, 2015, Bahiigwa, 2001, Knorr and Bruegger, 2002).

To sum up, Non-Presential Education (ENP) is economically feasible on a small scale, provided that the means used are in line with the size of the population they attend and are appropriate from the point of view of values. These, in turn, in Non-Presential Education (ENP), are more subject to the variations produced by changes in institutional policies (Mirowski, 2002; Gill, 2005; Shah, 1978). This implies that the economic success of small non-face-to-face education models depends heavily on intelligence used in policy design and experimental management (Gill & Gill, 2009, Tilak, 2006).

Fixed values and variable values in Non-Presential Education (ENP) and in Conventional Education (EC)

The fixed values in an educational system are those that are given independently of the number of students enrolled. On the contrary, variable values are those that depend directly on enrollment (Burker and Serban, 2008; Ghosh, 2007; Glezerman, 2016).

In Conventional Education (EC), variable values are usually higher than fixed values, since as has been said; Teachers' salaries represent the most important variable in terms of values (Brown, 2015, Shah, 1983, Knorr, 1981).

The most important fixed values in Non-Presential Education (ENP) are: production of materials, transmission of programs and administration (Barr, 2011; Shah, 1984; Ansari, 1997).

Individual values in Non-Presential Education (ENP)

Understanding by this, the total value that a student pays during a semester to be sustained in the program or career that is taking place. Among these variables are transport, food, accommodation, printed materials and modules, tools and stationery (Kulakowski, 2006; Ghosh, 1983; Smith and Snowden, 1983).

Conceptual category

VALUE: Maintenance expenditures for the operation of a program, degree or organization, without taking into account the individual cost and also without taking into account the income that students are deprived of studying and not working (Levin, 2015, Jongbloed, 2000, Hirt, 2012).

TOTAL TOTAL VALUE PER PROGRAM: It is the semiannual maintenance for the operation of the Bachelor's Degree in its respective modality, including its personal services expenses, general expenses, financial expenses, leases, depreciation and amortization, in addition the corresponding expenditures of the units Administrative units (proration), academic units (proration) and units of other units with their special programs (proration). (Note: Prorations were given based on the percentage of students). This is given according to the "criteria" of the Planning Office of the University of Antioch and are agreed between this and the directors of the Faculty of Education, in a governmental entity of the Republic of Colombia.

The total is multiplied by the inflation index and devaluation semi-annually, taking as deflator with respect to period A.

NOTE: The six-month inflation and devaluation index from A to H was taken as deflator with respect to period A in each of the values of the present study, provided by the National Administrative Department of Statistics (DANE), Bogotá. Shown in the following table:

Table 1. Six-month inflation and devaluation index from A to H with respect to period A

INDICE INFLACIONARIO Y DEVALUATIVO	PERIODO SEMESTRE
0.83420	A
0.76418	B
0.65270	C
0.59890	D
0.53140	E
0.50580	F
0.45590	G
0.43669	H

Source: (según DANE).

ACADEMIC SEMESTER: It is the number of academic weeks that one of the periods in which an academic program usually divides, usually separated from another by a period of vacations; For the purpose of measuring their duration in academic weeks, the first day of school is taken into account until the day of the last examination.

In the present study the academic semester is considered to be 16 weeks.

NUMBER OF STUDENTS: The number of students enrolled in a particular program, regardless of the number of subjects they take, but subject to the specific regulations of the University of Antioch. The information is taken approximately three months after the day of the initiation of classes, when it is assumed that the period of additions and cancellations of subjects and enrollment ends.

CONVENTIONAL EDUCATION (EC): System or modality of education that favors the teaching-learning process, basically in face-to-face.

NON-PRESENCEAL EDUCATION (ENP): System or modality of education that relies on the use of multimedia that promote the teaching-learning process, basically in a non-presential way, in order to achieve educational objectives with a geographic and demographic coverage greater than that of A system of Conventional Education.

TOTAL VALUE: It is the addition of the Fixed Value and the Variable Value in each program, Degree.

"THRESHOLD POINT": For the present study the threshold point is the intersection of the graphs of total value in Conventional Education (EC) and total cost in Non-Presential Education (ENP) corresponding to each Bachelor program, and this point indicates that In that space the total values are equal in Conventional Education (EC) and Non-Presential Education (ENP).

Limitations: This study is limited by its confidentiality in the data and academic abnormalities that the University of Antioch has had. Fixed values and variable values will be determined indirectly, so their value will be approximated. The cost is limited to maintenance expenditures for the operation of a program or organization, without taking into account the individual cost and also without taking into account the income that students are deprived of when studying and not working.

Methodology

The present study is based on the university values of the work "Distance Education in Antioquia from Theory to Reality" (Vásquez and Restrepo, 2005).

Population

The population for the analysis of educational values in Conventional Education (EC) and Non-Presential Education (ENP) at the University of Antioch, is the following:

In Conventional Education (EC), Undergraduate, the following program, Licenciado en Agropecuaria, will be taken into account.

In Non-Presential Education (ENP), Undergraduate, will have in the following program, Graduate in Agriculture.

Variables

Total Cost per Semester per Program

Bachelor of Agriculture (EC) 211624.

Table 2. Period - number of students - total semester value per Degree of Agricultural License - EC in constant pesos with respect to period A.

PERIODO SEMESTRE	NUMERO DE ALUMNOS	COSTO TOTAL SEMESTRAL POR PROGRAMA, CARRERA LICENCIADO AGROPECUARIO (EC)
A	2	211,624
B	2	223,783
C	17	449,367
D	14	344,834
E	14	412,812
F	13	329,809
G	15	377,625
H	15	371,138
I	15	396,405

Total Cost per Semester per Program

Licenciado Agropecuario (ENP) 397834.

For the other semesters, a similar procedure was applied, working in advance with constant weights with respect to period A, with the following table:

Table 3. Period - number of students - total semester value per degree program - ENP. In constant pesos with respect to period A.

PERIODO SEMESTRE	NUMERO DE ALUMNOS	COSTO TOTAL SEMESTRAL POR PROGRAMA, CARRERA LICENCIADO AGROPECUARIO (EC)
A	2	397,834
B	2	404,342
C	17	457,285
D	14	490,927
E	14	496,385
F	13	442,772
G	15	433,964
H	15	421,376
I	15	426,728

Process

In order to establish the values of each degree program, the work "Distance Education in Antioquia from Theory to Reality" (Vásquez and Restrepo, 2005) was consulted, in which the total values per semester for each program are mentioned, as well as As the number of students in each program, this for each semester-period from A to I.

These values were corrected with the above-mentioned inflation and devaluation indices. In each semester the number of students is known for each program, so that points of the function $VT = VF + vD$ are obtained, where:

VT = Semiannual Total Amount per Program.

VF = Fixed Value.

V = Marginal Value (slope)

D = Number of Students

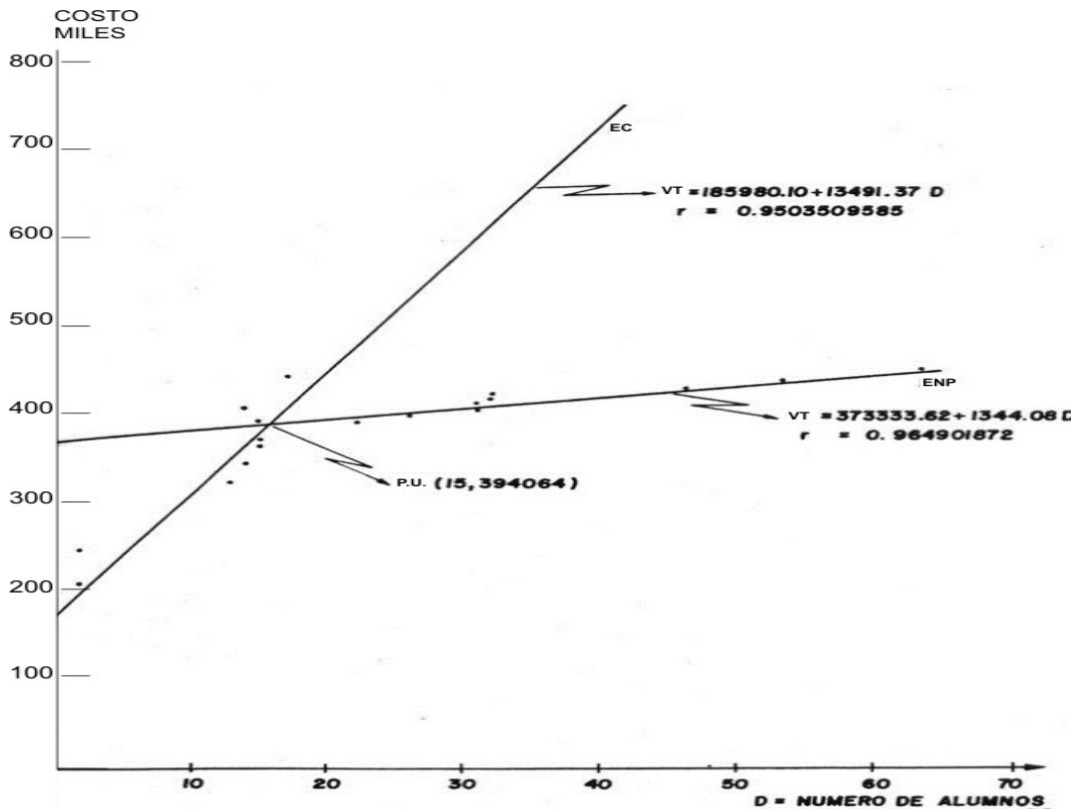
Table 4. Historical evolution of the number of students in EC-University of Antioch programs, Period-Semester A to I.

Periodo Semestre Programa Licenciado Agropecuario	A	B	C	D	E	F	G	H	I
	2	2	1 7	1 4	1 4	1 3	1 5	1 5	1 5

Table 5. Historical evolution of the number of students in ENP programs - University of Antioch, Period-Semester A through I.

Periodo Semestre Programa Licenciado Agropecuario	A	B	C	D	E	F	G	H	I
	2	2	6	3	3	5	4	3	3
	2	6	3	1	1	3	6	2	2

Graph 1. Total Biannual Value per Program Licenciado Agropecuario.



This allowed for an analysis of each program stating the Total Value and Threshold Point equation.

The information found was condensed in the following tables:

Table 6. Modality-equation-correlation coefficient-threshold point in the Licenciado Agropecuario program in constant pesos with respect to the period-semester.

MODALIDAD	ECUACIÓN	COEFICIENTE DE CORRELACIÓN	PUNTO DE UMBRAL
EC	$VT=185980,10+13491,37 D$	0.9503509585	D = 15 Alumnos VT = 394064 pesos
ENP	$VT=373333,62+1344,08 D$	0.964901872	

Table 7. Fixed value and variable value with respect to the threshold point in constant pesos of the semester-period, A in EC programs - University of Antioch

PROGRAMA	VALOR FIJO	VALOR VARIABLE
Agropecuaria	185980	208084
Biología-Química	4'429507	6'782350
Docencia Comercial	288299	122995
Electrotecnia	198051	247275
Idiomas Español Literatura	3'318743	3'534784
Sociales Geografía Historia	2'354442	3'186191
Matemática-Física	1'382263	1'382263
Mecánica Industrial	482437	612238

Table 8. Fixed value and variable value with respect to the threshold point in constant pesos of the semester-period A, In ENP programs – University of Antioch

PROGRAMA	VALOR FIJO	VALOR VARIABLE
Agropecuaria	373334	20730
Biología-Química	10'161843	1'050004
Docencia Comercial	324659	86634
Electrotecnia	310996	134329
Idiomas Español Literatura	6'432987	420539
Sociales Geografía Historia	5'190794	349838
Matemática-Física	3'724327	102906
Mecánica Industrial	889095	205580

Analysis

In the time period-Semester from A to I at the University of Antioch, in the modalities EC and ENP, referring to values the following analysis is presented.

In graph 1 the linear regression equations of ENP and EC of the Degree of Agricultural Degree with its Threshold Point (PU) are presented.

In conventional education (EC) linear regression is $VT = 185980.10 + 13491.37 D$ (Table 6) with a correlation coefficient $r_1 = 0.9503509585$ significant with $\alpha = 0.05$, n-2 g. L., since the theoretical value in Statistical Table (Glass and Stanley, 2006) of $r = 0.666$, g. L. n-2 at $\alpha = 95\%$ bilateral, is lower than the value found $r_1 = 0.9503509585$ ($p < 0.01$).

A Fixed Value (V.F.) 185980.10 (Table 7)

A Marginal Value $v_1 = 13491,37$ which is the slope of the linear regression.

Where v_1 represents the value needed by one student on the D axis.

By equivalence in Bivariate Regression the slope and correlation test are equivalent.

The coefficient of correlation $r_1 = 0.9503509585$, indicates a good positive direct linear relation between Y (VT = Total Semester Value per Program) and X (D = Number of students, with a coefficient of determination $r^2_1 = 90.32\%$ Expresses the proportion of total variation in the values of the variable Y that can be considered or explained by a linear relation with the values of the variable X (D = Number of Students).

In Non-Presential Education (ENP) linear regression is $VT = 373333.62 + 1344.08 D$ (Table 6) with a correlation coefficient $r_2 = 0.964901872$ significant with $\alpha = 0.05$, n-2 g. L. because the theoretical value in Statistical Table (Glass and Stanley, 2006) of $r = 0.666$, g. L. N-2 at $\alpha = 95\%$ bilateral, is lower than the value found $r_2 = 0.964901872$ ($p < 0.01$).

A Fixed Value (C.F.) = 373333.62 (Table 8)

A Marginal Value $v_2 = 1344.08$ which is the slope of linear regression.

Where v_2 represents the value needed by one student on the D-axis.

By equivalence in Bivariate Regression the slope and correlation test are equivalent.

The coefficient of correlation $r_2 = 0.964901872$, indicates a good linear relationship, positive direct between Y (VT = Total Semester Value per Program) and X (D = Number of students.) With a coefficient of determination $r^2_2 = 93.10\%$ Expresses the proportion of total variation in the values of the variable Y (VT = Semiannual Total Value per Program) that can be considered or explained by a linear relation with the values of the variable X (D = Number of students).

When the Linear Regression of Conventional Education (EC) intersects with the linear regression of Non-Presential Education (ENP), it forms the Threshold Point (PU), where at this point VT and the number of students are equal (D Table 4 and 5) in Conventional Education (EC) and Non-Presential Education (ENP).

Linear Regression in Conventional Education (EC): $VT = 185980,10 + 13491,37 D$ Ec. (1)

Linear Regression in Non-Presential Education (ENP): $VT = 373333,62 + 1344,08 D$ Ec. (2)

Equating VT in equations (1) and (2)

$$185980.10 + 13491.37 D = 373333.62 + 1344.08 D$$

$$13491.37 D - 1344.08 D = 373,333.62 - 185980.10$$

$$12147.29 D = 187353.52$$

$$D = 187353,52 / 12147,29 = 15.42 \approx 15$$

In the Threshold Point (PU), a VT = 394064 constant pesos with respect to the period A, a D = 15 Students (Table 10), a Variable Value (VV) (Table 7) in Conventional Education (EC) of 208084 constant pesos with respect to period A, a Variable Value (VV) (Table 8) in Non-Presencial Education (ENP) of 20730 constant pesos with respect to period A.

In conclusion, if the number of students is more than 15 in the Non-Presencial Education Agricultural Graduate Course (ENP), it is less expensive than that of Conventional Education (EC).

Conclusions

The Threshold Point (PU) is valid for the series of conditions that existed during the period from A to I in which the data provided by the Planning Office of the University of Antioch were used.

The Threshold Point (PU) takes into account past experience and determines probable effects that can be projected from the past in the operations of an immediate future for the University of Antioch, for example, increase or decrease of physical plant, teachers, materials Didactics, equipment, physical plant replacement and obsolete equipment.

In the Conventional Education (EC) programs, linear regressions were of the form $VT = (VF) 1 + v1D$, where VT is the Semiannual Total Value per Program, D is the number of students, (VF) 1 is the term Independent and indicating a fixed value, v1 is the marginal (slope) value.

The correlation coefficients (greater than 0.9) were found to be significant with $\alpha = 0.05$, n-2 g.L., since the theoretical value in statistical tables (Glass and Stanley, 2006) of $r = 0.666$, g.L. N-2 to $\alpha = 95\%$ bilateral, is lower than those found ($p < 0.01$),

By equivalence in Bivariate Regression the slope and correlation tests are equivalent.

The correlation coefficients found in the different programs of Conventional Education (EC) are good (greater than 0.9), indicating a good positive direct linear relationship between VT and D, so that the values of VF (Fixed Values in EC) and VV (Variable Values in EC) should be significant. And also good coefficients of determination (greater than 0.8), where it is probable that with these determination coefficients they express the proportion of the total variation in the values of the variable VT that can be considered or explained by a linear relation with the values of The variable D.

In Non-Presential Education (ENP) programs, linear regressions were of the form $VT = (VF)^2 + v2D$, where VT is the

The correlation coefficients (greater than 0.9) were found to be significant with $\alpha = 0.05$, n-2 g.L., because the theoretical value in statistical tables (Glass and Stanley, 2006) of $r = 0.666$, gL. N-2 to $\gamma = 95\%$ bilateral, is smaller than those found. ($P < 0.01$).

By equivalence in Bivariate Regression the slope and correlation tests are equivalent.

The correlation coefficients found in the different Non-Presential Education (ENP) programs are good (greater than 0.9), indicating a good positive direct linear relationship between VT and D, so that the values of VF (Fixed values in ENP) and VV (Variable values in ENP) must be significant. And also good coefficients of determination (greater than 0.8), where it is probable that with these determination coefficients they express the proportion of the total variation in the values of the variable VT that can be considered or explained by a linear relation with the values of The variable D.

When the linear regression of the respective Conventional Education (EC) program intersects with the linear regression of the respective Non-Presential Education (ENP) program, it forms the "Threshold Point", where at this point VT Program).

In conclusion, if the number of students is greater than the abscissa assigned in the Threshold Point in the analyzed program of Non-Presential Education (ENP) then it has less value than those of Conventional Education (EC) in the period from A to I. The institution

saves more semiannual Total Value resources in the Non-Presential Education (ENP) program on Conventional Education (EC).

Recommendation

It is suggested that for future studies of university values, the threshold points of each of the careers in each educational institution should be carefully analyzed in order to obtain the varied values and fixed values of the administration of Higher Education Institutions.

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