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TECHNOLOGICAL SKILLS IN THE ACADEMIC PERFORMANCE OF STUDENTS

Urbano Luna-Maldonado[1] --- Héctor Flores-Breceda[2] --- Juan Antonio Vidales-Contreras[3] --- Humberto Rodríguez-Fuentes[4] --- Alejandro Isabel Luna-Maldonado[5†]
[1,2,3,4,5]Department of Agricultural and Food Engineering, Faculty of Agriculture, Autonomous University of Nuevo Leon , Mexico

ABSTRACT

The objective of this research was to analyze the effect of technological competence (teacher, Internet, smart classroom), to obtain academic performance of students of higher level of the Colleges of Agriculture and Veterinary Medicine at the Autonomous University of Nuevo Leon. We applied qualitative and quantitative methods, and simultaneously, a statistical design allowed us to make more reliable calculations. We also used two instruments: surveys and assessment test the research question.

Keywords: Feasibility, Teacher, Student, Technological skills, Internet, Smart classroom, Academic performance.

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Contribution/ Originality

This study shows how much academic performance is generated from the use of technological competence in the classroom, and how the financing institutions to provide results in a benefit to the student. There is a needed to develop technical competence to opens up new educational possibilities in the classroom and critical thinking.

1. INTRODUCTION

In Mexico, the expansion of technological competence (teacher, Internet, smart classroom) has reached a large number of institutions of all levels of education: primary, secondary, and vocational school. This has created the need for updating of teachers and students in developing these skills to improve school academic performance. Therefore, research was needed on the benefits of technological skills (teaching, internet, smart classroom) applied in the teaching and learning of higher level students, and observe the surveys and assessments applied to certain samples of students to investigate and verify their perception of academic performance (Martinez-Olivé, 2006). The case studies on OECD schools deal with potential changes in education, and that lead to the introduction of technological competence (González, 1999). This study concludes that "the technological skills not usually act as a catalyst for school change by themselves, but can be a trigger vigorous educational innovations planned" (Venezky and Davis, 2002). Internet is currently used technological competence in teaching, used to connect to the global knowledge (Raposo *et al.*, 2006; González and Vidaud, 2009). The teacher is a determining factor in the transmission of technological competence and must be updated constantly, the student becomes the center of the teaching-learning process, and it must receive the full support of the teacher. The smart classroom is another factor in this process (Lozano-Diaz, 2003; Jaramillo *et al.*, 2009). All these elements can be feasible to achieve academic excellence in the education of our country. According to the OECD (Organization for Economic Cooperation and Development), responsible for conducting the evaluation every three years to the national education system,

† Corresponding author

internationally, by the PISA (Programme for International Student Assessment , LLECE (Laboratory for Assessment of the Quality of Education) and the test EXCALE (Assessment of the National Institute for the Evaluation of Education for students between 15 and 16 years), our country is among the lowest in education is concerned (Naresh, 2004). It is critical professional preparation, updating the knowledge and skills of each teacher, to communicate what they know, because of the emergence of the powers in the international context in which the student becomes the center of teaching and learning in the classroom (Tornimbeni *et al*., 1998). In addition, technology is a determining factor in their education. Therefore, education must ensure student learning, through a constant process of updating by the teacher to address the changes in education. The approach must express three criteria problem statement either: a) the relationship between two or more variables, b) be stated clearly and unambiguously as question, c) the problem must meet possibility of being subjected to an empirical test (Wills and Garcia-Cabrera, 2005).

Are the technological competencies affect / improve the academic performance of a student population? The technical competence: teachers, Internet, smart classrooms, improve student academic performance through the use thereof by the teachers in class, learning to pass and also that students are responsible to use these skills in relation the learning process (Karsienti and Lira, 2010).

Thus, the importance of the proper use of technological competence, by the teacher and the student in the classroom, improve education of new professionals in society (Cuevas *et al*., 2011).

Also, the use of these in the classroom opens up new possibilities for development of skills that generate new knowledge in education, skills and retrain teachers and students have (Mirador University, 2012). As technologies in general and media in particular have broken into homes, is necessary for students to become more technological competence, to the extent that critics and viewers are active against technological messages.

This study is to propose new lines of research in the area of technological competence, to show high academic performance of those in education.

Our country is in 51st place in human development, according to the survey provided by the OECD (Serrano-Santoyo and Martínez-Martínez, 2003) in regard to broadband connections. In this area, in 2001 was relatively low.

Hence, the need for greater investment in technologies applied costs in education.

One of the definitions of technological competence: that students develop skills in real time by the teacher, to be evaluated efficiently. Possessing the technological skills of primary school teachers must be designed to enhance curricular integration of information technology (Quintana-Albalat, 2000).

The importance of technological competence has affected all areas of knowledge, observing that knowledge itself is a source of development in industrialized and developing countries. Another important aspect of the technological skills is to visualize if they affect the learning process of college students, and if the impact is minimal, seek effective mechanisms for use in the process of improving higher education (Suárez *et al*., 2010).

The objective of this study is to make an assessment of the use of technological skills by the teacher and the student, using two research instruments, the survey and evaluation for obtaining academic performance of students. Ahumada (2005) says: "The assessment is a systematic process for gathering information about student learning and performance, based on various sources of evidence."

The specific objectives are:

1) The purpose of this section is to analyze and discuss the theory and research used as part of the explanation of technological skills. We studied the concepts competence, technological competence, teachers, Internet, smart classroom, academic performance, for the research project.

2) Analysis of data from two groups of Veterinary vs Agronomy, through the Student t test statistic.

3) Determine the equality between two variances assessment of two groups of Agronomy, of different generations.

4) Determine the level of awareness of technological skills by students, from the application of a survey.

2. MATERIALS AND METHODS

Among the research questions were handled the dependent variable and the independent. Hernandez *et al.* (1998) defined the independent variable as the supposed cause or history of the dependent variable, or consequential effect. They also say that by the dependent variable is the prediction, while independent from the predicted. The independent and dependent variables are symbolized as x and y, respectively. The independent variables are the technological skills: teachers, students, smart classrooms, Internet, to support teaching.

2.1. Among the Questions in the Questionnaire Are

1. Does it affect the development of technological competence in the academic performance of college students?
2. What is the role of the school in the Knowledge Society?
3. What new knowledge require new generations of students?
4. What skills teachers need to develop XXI century?
5. How to deal with rapid changes in education as?
6. Can all students in a classroom to develop technology skills?
7. What is the school in the New Millennium?
8. What role should meet the teacher for their students to develop technology skills?
9. What is the purpose or goal of technological competence in higher education?
10. Do the students require technological skills to better their participation in the knowledge society?

The research design was formulated for this study is defined as "non-experimental or ex post facto", as there is no active manipulation of some variable, but observed situations that have already happened. It also lists as transactional or cross design (Hernandez *et al.*, 1998) because it involves the observation of phenomena in a single point in the process. This design is also cross explanatory (Behling, 1984) it aims to make statements about the population studied. With this research design, are tested the hypothesis and the relationship between the dependent and independent variables.

The population consisted of 97 students from the Colleges of Agriculture and Veterinary Medicine of the Autonomous University of Nuevo Leon, who attend the course on Probability and Statistics. Three groups were selected from the College of Agriculture and two groups of the Veterinary School, enrolled in first, second and fifth semester who participated in the study. Another characteristic of the sample of 97 students, 50 are female and 47 male.

The variables were:

Academic performance: Variable quantitative, performance characterized as high, medium, low, and poor, based on the table prepared by Reyes-Murillo (1998). The indicator for this variable is the weighted average of each student, after the end of the semester.

Technological competence: Those skills necessary to manage and use all the resources necessary technology for the design and development of e-learning, from a technical standpoint (Internet tools, synchronous and asynchronous communication, and authoring tools: graphic design, page web, etc.). It also involves the knowledge and use of the platform on which to develop the training activity in order for it to be adapted to the type of student and course, in each case assessing the adequacy of the same.

2.2. Data Collection Techniques

The surveys were applied to students, and the survey was presented in three sections: 1) use information and knowledge of technological competence, 2) general skills to use the technologies, 3) use of technological competence in teaching (in classrooms). The survey consisted of 51 closed questions, which should be answered with: Yes, and sometimes not.

Panel surveys lasted 15-25 minutes. The purpose of these is to visualize the degree of knowledge of the technological skills aimed at efficient academic performance by students.

Statistical Analysis: According to Luna-Maldonado (2012) for statistical analysis can be used the following statistical variables:

Arithmetic Mean: A measure of central tendency known as a center of gravity and the obtained value (score) in a distribution that corresponds to the sum of all values (scores) divided by the total number of values or subjects.

$$\bar{X} = \frac{\sum_{i=1}^{n} X_i}{n} \quad (1)$$

Variance: is a measure of variation of the data set. The variance is calculated as the average squared deviation of each value (score) of their mean.

$$s^2 = \frac{\sum_{i=1}^{n} (X_i - \bar{X})^2}{n-1} \quad (2)$$

Standard deviation: This corresponds to the square root of the standard deviation. Dispersion is far more commonly used

$$\sqrt{s^2} = \frac{\sum_{i=1}^{n} (X_i - \bar{X})^2}{n-1} \quad (3)$$

Coefficient of variation: is a normalized measure of dispersion of the probability distribution. Also known as unit risk. Is the standard deviation divided by the mean. The lower the coefficient of variation, the lower the risk prediction.

$$\mathrm{CV} = \frac{s}{\bar{x}} 100 \quad (4)$$

Student's test: Best and Kahn (1995) define it as a probability distribution that is used when comparing two samples and engage small and variances are equal or nearly equal. In the comparison of two means with the Student t supposed to exist: a) a normal (Gaussian) populations of random errors, b) there is no significant difference between the standard deviations of the two population samples (Efstathiou, 2012). 2/2 and the corresponding standard deviations are calculated using the following equations (nA and nB is the number of measurements in the data set and the data set B, respectively):

$$S_A = \sqrt{\frac{\sum_{i=1}^{n_A} \left(\bar{X}_A - X_i \right)^2}{n_A - 1}} \qquad S_B = \sqrt{\frac{\sum_{i=1}^{n_B} \left(\bar{X}_B - X_i \right)^2}{n_B - 1}}$$

Then, the pooled estimate of the standard deviation is calculated SAB:

$$S_{AB} = \sqrt{\frac{(n_A - 1)S_A^2 + (n_B - 1)S_B^2}{n_A - n_B - 1}}$$

Finally, the calculated statistic t (experimental value of t) is calculated as:

$$t_{exp} = \frac{[\overline{X_A} - \overline{X_B}]}{S_A\sqrt{\frac{1}{n_A}+\frac{1}{n_B}}} \quad (5)$$

F Test. Pham (2006) says that Fisher or F test is used primarily for testing the equality between two variances. Unlike the Student t distributions, where each of them has only one parameter, the F distribution has two parameters: the number of degrees of freedom (df) usually denoted gl1 and gl2. A specific distribution F, or the specific shape of the curve F, is completely determined when known GL1 and GL2. The Fisher test is used when you have two nominal variables.

Analysis of variance: inferential method is used for testing the equality of means of populations. The analysis of variance is an extension of the Student t test for independent samples.

$$H_0: \mu_1 = \mu_2$$
$$H_1: \mu_1 \neq \mu_2$$

3. RESULTS

In Table 1 are grouped students by level of degree studies. Figure 1 shows the scatter plots for groups of students who answered Yes, No or Sometimes to the survey questions, we found a greater number of responses Yes.

Table-1. Undergraduate level of the students

Study level

	Undergraduate	Percentage
	97	100
1st. Semester	37	38.1443299
2nd. Semester	32	32.9896907
5th . Semester	28	28.8659794

Source: Department of Student Records and Transcripts in Faculty of Agriculture and Faculty of Veterinary, Autonomous University of Nuevo Leon.

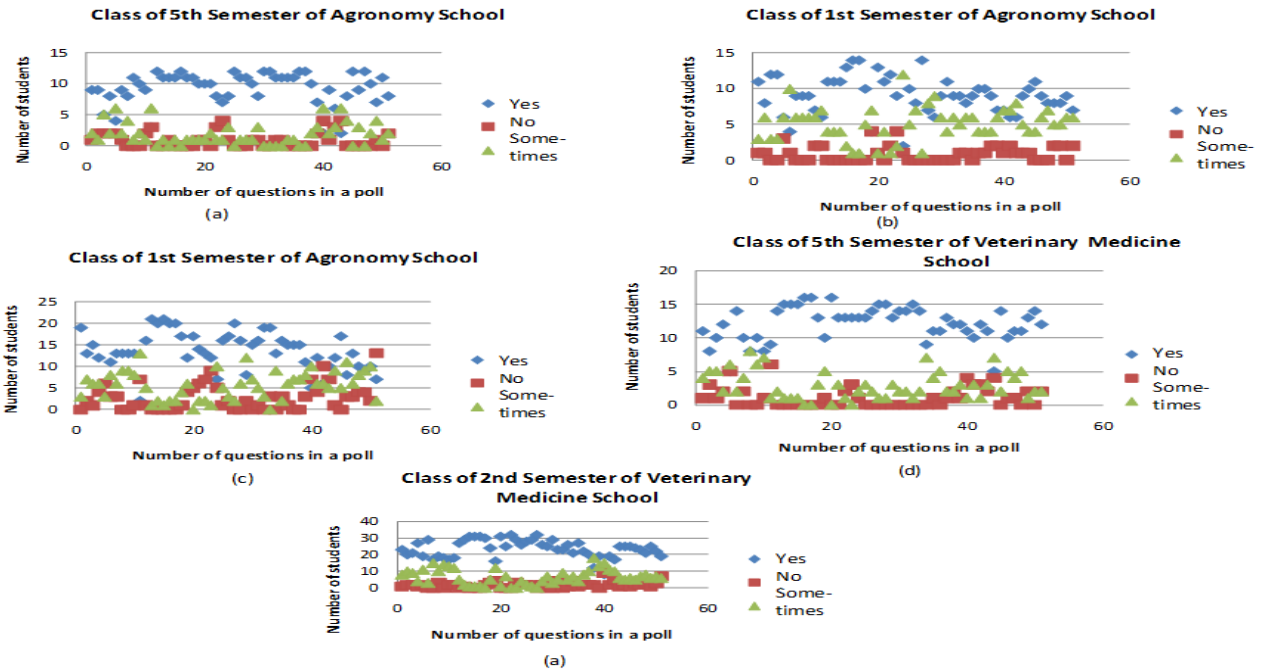

Fig-1. Poll results: a) 12 students of the fifth semester of the College of Agriculture, b) 15 students in the second semester of the College of Agriculture, c) 21 students in the first semester of the College of Agriculture, d) 16 students in fifth half of the Veterinary Faculty, e) 32 students in the second semester of the Faculty of Veterinary Medicine of Autonomous University of Nuevo Leon.

Source: Department of Student Records and Transcripts in Faculty of Agriculture and Faculty of Veterinary, Autonomous University of Nuevo Leon.

The results, after performing the surveys that were applied to students of the Faculties: Agriculture and Veterinary in Autonomous University of Nuevo Leon, seen in Figures 3, 4, and 5, which are presented according to the most representative aspects evaluated.

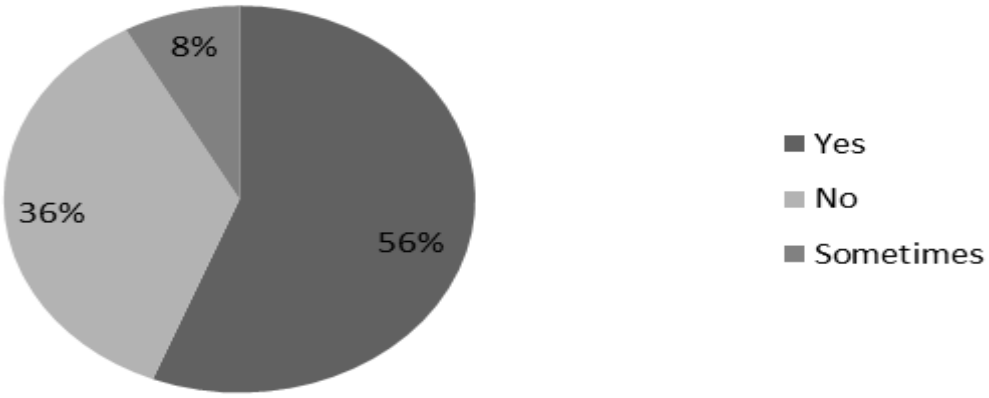

Fig-2. In the survey, 62% of students answered yes to work with ICT in the classroom helps the teaching-learning process, 38% said no, 0% answered sometimes. Resulted in more than half opine that ICTs enable teaching and learning process.
Source: Department of Student Records and Transcripts in Faculty of Agriculture and Faculty of Veterinary, Autonomous University of Nuevo Leon.

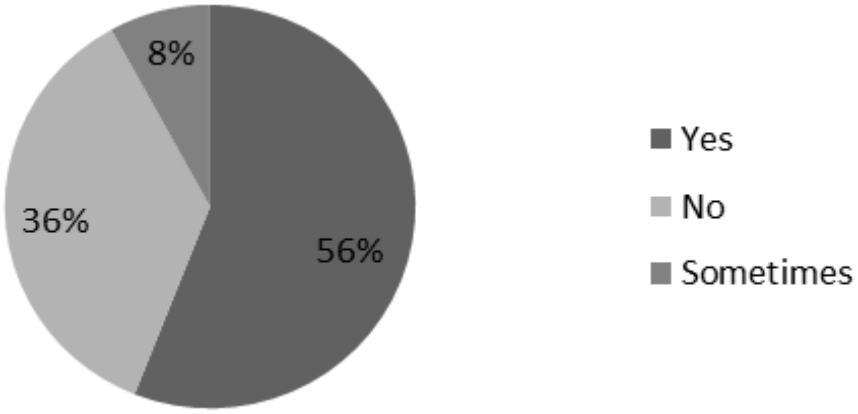

Fig-3. Asked 10 Which method is more suited to the interests and needs of each student: the traditional or ICT? 62% of respondents answered yes to the use of ICT, 30% replied that the traditional 8% of respondents answered that the two.
Source: Department of Student Records and Transcripts in Faculty of Agriculture and Faculty of Veterinary, Autonomous University of Nuevo Leon.

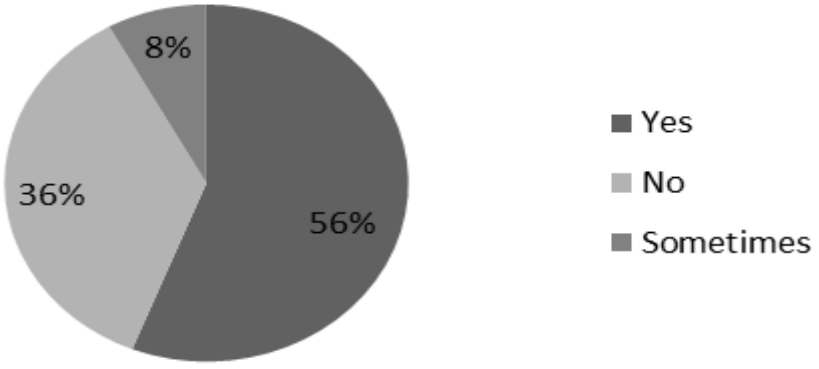

Fig-4. 56% of respondents answered yes to question 44: Do the teachers have implemented technological competence in your teaching and learning in the classroom? 36% of respondents said no to the implementation of technological competence in the classroom, and 8% said that once implemented ICT in the classroom.
Source: Department of Student Records and Transcripts in Faculty of Agriculture and Faculty of Veterinary, Autonomous University of Nuevo Leon.

Table 2 shows the measures of central tendency and measures of variation in the statistical analysis of the survey data used for students of Autonomous University of Nuevo Leon who responded Yes, No, or Sometimes the questions. It was found that in the answers with a Yes, the means were 9.3 ± 2.6, 9058 ± 2.59, 13.53 ± 4.49, 12.08 ± 2.59, 23.63 ± 5.33 for groups of students fifth semester, second semester and first semester of the Faculty of Agriculture, and fifth semester and second semester at the School of Veterinary Medicine of the Autonomous University of Nuevo Leon.

Table-2. Mean, standard deviation and coefficient of variation of students groups the Colleges of Agriculture and Veterinary of Autonomous University of Nuevo Leon, who responded Yes, No, or Sometimes to survey questions.

	Class of 5th Semester of Agronomy School			**Class of 1st Semester of Agronomy School**			**Class of 1th Semester of Agronomy School**			**Class of 5th Semester of Veterinary Medicine School**			**Class of 2nd Semester of Veterinary Medicine School**		
Estimator	Yes	No	Sometimes	yes	No	Sometimes	Yes	No	Sometimes	Yes	No	Sometimes	Yes	No	Sometimes
Mean	9.3	0.92	1.78	9.06	0.82	5.12	13.53	2.72	5.59	12.08	1.08	2.84	23.63	1.78	6.59
Standard Devation	2.6	1.2	1.75	2.59	1.05	2.3	4.49	3.02	3.27	2.59	1.47	2.05	5.83	1.83	4.5
Coefficient of Variation	0.3	0.9	0.9	0.29	1.28	0.45	0.33	1.11	0.58	0.21	1.36	0.72	0.23	1.02	0.68

Source: Department of Student Records and Transcripts in Faculty of Agriculture and Faculty of Veterinary, Autonomous University of Nuevo Leon.

The result between the means of the response if the groups fifth semester of the College of Agriculture and the fifth semester of the Veterinary Faculty Student t was calculated (Table 3) of 2.108. It is known that if the value of the Student t calculated (2.108) is greater than the value of the Student t table, we conclude that there is a statistically significant difference between the two treatment means at 5% or 1% significance level. In this study there were significant differences, since the value of Student's t tables (for degrees of freedom (df) = 51-1 +51-1 = 100) was 1660 for a significance level of 5%, as there were 1984 worth of tables Student's t with 100 degrees of freedom and 2.5% level. Furthermore, to determine equality between two sampled of final grades of two groups of the Faculty of Agronomy of different generations, the result shown in Table 3.

Table-3. Analysis of variance between two variances sampled of final grades of two groups of Agronomy.

Analysis of Variance						
Source	**Sum of Squares**	**Degree of Freedom**	**Mean of Squares**	**Probablity**	**F**	**F (Table)**
Between Groups	0.1	1	0.1	0.967	0.0018	5.317
Whitin Groups	442.4	8	55.3			
Total	442.5	9				

Source: Department of Student Records and Transcripts in Faculty of Agriculture and Faculty of Veterinary, Autonomous University of Nuevo Leon.

4. DISCUSSION

The theory proposed was accepted as the table value was 0.0018 (for degrees of freedom (DDL) = 5-1 +5-1 = 8) is 5.317655 for a significance level of 5%. The difference is not significant between the two groups, because F is less than the critical F tables.

Analysis was performed with the statistical program of Microsoft Office Excel 2007, to validate the results, and a survey was developed in which 51 questions related to the students' knowledge about the technological skills. The survey chose the three most important questions, and the predominant response was Yes Another way to validate the study was the application of statistical analysis Students t, for the analysis of the assessment of two groups of students of the Faculty of Agronomy, comparing their final grades.

5. CONCLUSIONS

We obtained a high academic performance with a minimum difference in scores on assessments of students for semesters of 1985 and 2011. The responses to the survey questions with Yes, the means were 9.3 ± 2.6, 9058 ± 2.59, 13.53 ± 4.49, 12.08 ± 2.59, 23.63 ± 5.33 for groups of students fifth semester, second semester and first half of the Faculty of Agriculture, and fifth semester and second semester of the Faculty of Veterinary and Medicine of the Autonomous University of Nuevo Leon, respectively. Final grades of two groups of different generations from Faculty of Agronomy (1985 and 2011) showed no significant difference in relation to academic performance obtained.

Study limitations are that it applies only to students in two Faculties: Agriculture and Veterinary (Autonomous University of Nuevo Leon). They looked only two survey instruments (survey and evaluation) to solve the research problem. In addition, the study was limited to only part of the technological skills: teachers, students, smart classrooms, Internet, and the sample used for analysis was minimal: 97 students of the Faculties of Agriculture and Veterinary (Autonomous University of Nuevo Leon). Other limitations were that it had to apply for approval of educational institutions and the time required for research (six months). We conclude that the study found no significant variation in the academic performance of students from the Faculties of Agriculture and Veterinary.

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