# LEARNING KINDS FOR STUDENTS OF TECHNICAL HIGH SCHOOL

# AN ANALYSIS FROM THE DAVID AUSUBEL'S THEORY

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## Abstract

This article presents the findings of a field research, not experimental, observational, correlating, basic, of mixed data, micro sociologic, leading to a study of surveys.

The object of study is to find learning kinds, and the unit of analysis were 529 high school students between 16 and 21 years old. Its purpose is to understand the impact of learning by rote, guided, self learned and meaningful learning and its achievement degree besides the learning outcomes of differentiated curriculum based on David Ausubel's thoughts, associated with different economic specialties (MINEDUC, 1998) where the population of the study is trained. To collect data, the test TADA - DO2 was used, this test has a reliability index of 0.911 according to Cronbach. From the hits it can be stated from the null hypothesis that there is a significant association ($\alpha = 0,05$) between the learning kinds and the learning expected of differentiated training plan for both, male and female. It is complex to state that the training of the middle-level technicians leads to a successful employment.

**Key Words:** Learning kinds, Technical education, Ausubel's theory, Expected learning, Achievement degrees.

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## I. PROBLEM

### 1. Backgrounds

In the beginnings of XVII century, Mr. Manuel de Salas y Corbalán created the San Luis Academy that will become the germ of the Professional Technical education in Chile. Later, in 1842, the School of Arts and Crafts was created.  As years pass by, the education in our country has divided in two: primary for large populations and secondary, more selective and for this reason, with smaller amount of attendants. In 1908 this last one was divided in two kinds of training: schools that provided general training and commercial schools, technical or craft training, as it were known them in the time.

In 1950, the technical education became more important when increasing its registration to respond to the requirements of the industrial sector of specialized human resources in certain areas. Since then, this technical education is revolves round - as it was already said - the expectations of the industrial development of our country, even when in this last years it has not respond to the requirements of the industrial sector, and neither it has managed to link the technical training with the acquisition of the necessary skills.

On December 01, 2009, the Department of Education through the Organization for the Cooperation and the Economic Development (the OECD), displayed the results on the Technical Formation in Chile. The document provides information and proposals of political strategy keys to improve this sector in our country and warns on the found deficiencies.

The diagnosis is that technical formation and the qualification in this area have been neglected in the initial education, the investigation in educational policy and the reforms have focused, mainly, in the primary and tertiary education. The report points that the linguistic and

mathematical abilities of the 15 years old students in Chile, "are not as solid as they should, and this problem can increase in students of technical training". Also, they explain that the training and practices of these students "are weak" and that there are not teachers enough and they aren't qualified enough for high school level. (The OECD 2009).

## 2.   Specific problem

The need to approach the investigation problem is to find out evidences that allow linking the impact of different kinds of learning in the results of learning of the high school technical students.

Do the learning kinds influence significantly ($\alpha = 0.05$), according to the Ausubel' theory, in the results of the differentiated plan – according to marks– of technical high school students in the different educational specialties in high school?

## 3.    Investigation purposes

### 3.1. General mission

To know the statistical influence that the learning kinds have, according Ausubel's theory  in the results of learning of the curriculum differentiated - expressed in marks - from high school technical students, in the different specialties.

### 3.2. Specific purposes

- Describe the different learning kinds per specialty, as the Ausubel's theory.
- Establish the correlations among the different learning kinds per specialty, according to the Ausubel's theory.

- Base the impact of the learning kinds, on the learning results of the plan of differentiated study – expressed in marks - of pupils from technical high school, in the different specialties.

## 4. Investigation questions

1. Which are the learning kinds, according to Ausubel's theory, of technical high school?

2. Is there any correlation between learning kinds and the level of achievement of expected learning in the differentiated curriculum, of students enrolled in technical specialties?

## II. THEORETICAL FRAMEWORK

## 1. About Ausubel

Ausubel has called his theory  "Meaningful Learning" and it is inserted in the constructivism paradigm, according to what was mentioned in the "Investigation Bases" (Cf. 1.2).

Then we wonder how the theory of the Meaningful Learning is related to this current of thought, and to find an answer we approach to what Ausubel, et to., (2003) defined as the Meaningful Learning.  He said in 1976: "If I had to reduce all educative psychology in a single principle, I would say as follows: the most important isolated factor that influences on learning is what the pupil already knows.  Ascertain this and teach accordingly". (Ausubel, 1983).

If we should take advantage on the "relevant concepts" or "previous organizers", then the new ideas, concepts and propositions can be meaningfully learned as other ideas, concepts or propositions should be clear and available in the cognitive structure of an individual and they should work like a point of "anchoring" to the first ones. Now then, if it is so, it is necessary to wonder then: What happens in those cases in which the beginner does not possess a

cognitive structure "defined" to work with? The answer is an invitation to create a cognitive structure through the initial memorizing process to begin to establish the cognitive structure of the individual.

It is necessary to clarify that Ausubel does not establish a distinction between meaningful learning and mechanical learning like a dichotomy, but like a *continuum*. Ausubel et to. (1983) concluded that: Both kinds of learning can occur concomitantly in the same learning task; for example the simple memorization of formulas would be located in one of the ends of that continuous (Mechanical Learning) and the learning of relations between concepts could be located in the other end (Meaningful Learning) (Ausubel et to. 1983, p.35).[1]

In relation to previous, it usually happens that teachers are suspended in the mechanical learning, which is unfortunate because when learning by heart, the contents appear to students as a finished result and only demands him to internalize or incorporate the matters (for example: a law, a poem, a theorem of geometry, etc.) that is available so you can recover it or reproduce it later, which without doubt is risky because the content is stored in short-term memory , and not having a constant and deep reinforcing, the information is lost and it is not retained in cognitive structure of the individual to relate it in future with new concepts, ideas and proposals that appear afterwards.

## 2.  A dialogue with Ausbelian's theory

Usually teachers worries very little or simply does not care about the internal process that is being carried out by the student, nor of the external factors that can help or attempt against these same processes, and to either learn to develop this interest or preoccupation it is necessary to have a dialogue with educative psychology, according Ausubel et al. (1983):

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[1]  This text is quite illustrative since a graph appears, jointly, with two axes: the vertical one that shows the type of learning that the pupil can make from Learning for Repetition (as the base) up to Significant Learning (as the roof). In the horizontal axis the Process appears, when the pupil goes from guided learning up to autonomous learning.

This one tries to explain the nature of the learning in the classroom and the factors that influence it, these psychological foundations provide the principles so that teachers find out the more effective methods of education, since to try to discover methods by "trial and error" is a blind procedure and, therefore unnecessarily difficult and uneconomical by themselves. According to which raises from educative psychology, it is necessary to know students deeply. This can be considered indispensable to reach quality levels when teaching apprentices.

Lopez Quintás (1994: 28): "we must come into play with them; it is not enough watching them from outside and control them. The dominion allows to handle, but not to know". This means that if the teachers carry out their work knowing their students and considering established learning principles, they will be able to rationally choose new techniques of education and to improve the effectiveness of their work that will be reflected in academic profits. Since we have to remind that, first of all, a good class starts from the moment the teacher performs a good planning and the greatest motivation of human beings is to know who share our daily lives.

n this aspect the Ausubel's theory of "Meaningful Learning" offers the appropriate frame for the development of the educative work, as well as for the design of coherent educational techniques with such principles, constituting itself in a theoretical frame that will favor such process that is based mainly on the fact that the student is discovering new concepts, ideas and proposals and that is also interested in knowing their peers more deeply. The above mentioned is what in Ausubel's theory is called "discovering learning" which involves that "the student should rearrange the information, relate it with his/her cognitive structure and reorganize or transform the integrated combination so that the expected learning can take place.

If the condition so that a learning is potentially meaningful is that the new information interacts with the previous cognitive structure and that the student has a positive disposition, this implies that the discovering learning is not necessarily meaningful nor learning by rote is obligatorily mechanic. As much one as the other can be meaningful or mechanic, depending on the way how the new information is stored in the cognitive structure; for example putting together a puzzle by trial and error is discovery learning in which, the discovered content (the puzzle) is incorporated arbitrarily to the cognitive structure and therefore it is mechanically learned. On the other hand, a physical law can be learned meaningfully with no need of being found out by the student, it can be heard, understood meaningfully and even used, only if he/she has in his/her cognitive structure the appropriate previous knowledge.

The discovery method can be adapted especially for certain learning as for example, learning of scientific procedures for a discipline in particular, on the contrary, for the acquisition of big volumes of knowledge, is simply inoperative and unnecessary. On the other hand, the explanatory method can be organized in such a way to favor meaningful receiving learning, being more efficient than any other method in the teaching - learning process to assimilate contents into the cognitive structure, as Ausubel says: "Receiving Learning, although it is phenomenologically simpler than discovery learning, arises paradoxically later in the individual evolution and especially in his purest verbal forms, implies a major level of cognitive maturity." (Ausubel *et to.*, 1983:36).

It is necessary to underline that in accordance with the Ausubel's theory, the discovery learning is developed easier in the preschool stage because the individual is also a beginner in the world that surrounds him, so he acquires concepts through an inductive process based on not verbal, concrete and empirical experience. Receiving learning – as Ausubel suggests - appears only when the child reaches such a level of cognitive maturity, which allows him to understand verbal concepts and propositions without requiring an empirical support.

It is necessary to emphasize that, even in the condition of apprentice, the human being is not always mentally ready to learn or to acquire new knowledge since, for example (and it is our scope), during the class, the student must be motivated, with a predisposition to learn and this is a teacher's main task, as a mediator between what the student knows and what he is expected to learn (new knowledge) using, besides the appropriate materials. It is important to take into account that a motivated pupil isn't the same that a student forced to learn.

So say Ausubel et. al. (1983): The student must show a disposition to relate substantially and not arbitrarily the new material to his cognitive structure, because the material that learns is potentially meaningful for him, that is to say, relational with his structure of knowledge on a not arbitrary base.

Therefore, this implies that the learning material could be related in a non arbitrate and substantial way - as points out Ausubel - through some pupil's cognitive specific structure, the same one that must have "logical meaning", that is to say, be relational in an intentional and substantial way with the corresponding and pertinent ideas that are available in the pupil's cognitive structure. In other words, a potential development appears and also a new cognitive content in the mind of the individual as a result of the meaningful learning. In this level we talk about a "Psychological Meaning" which depends not only on the mental representation that the pupil has of the meaningful material, but also, as Ausubel points out: "that the pupil really should previously have the needed ideas in his cognitive structure". (Ausubel *et to*., 1983: 55).

Deducing from Ausubel's thoughts, it is possible to affirm clearly that the meanings of concepts and propositions of different individuals are homogeneous enough to make possible an effective communication process and the understanding among people, and to make it possible, we are provided with language, as Ausubel says: "Meaningful learning is achieved through language, so it needs communication among different individuals and with oneself.

The mediation of language determines the meaningfulness of learning" (Ausubel et to., 1983, p.164)

How can we then get an effective communication if language, in many cases, is different from one person to another? So we must not confuse knowledge of vocabulary with effective communication or, as so called by Ausubel, with "Meaningful communication". We human beings can take forward a good process of communication; however we can spoil it if we do not have at first place a fluid dialogue with ourselves. If one does not learn to establish a "connection" with one's ego, neither will manage to do it with others, according to Warren (2000).

There are three kinds of meaningful learning: "learning of representation", "of concepts" and "of propositions ". Ausubel points out that representations learning refers to what occurs when you match the words, which are arbitrary symbols, with the objects, concepts or events that the word represents. (Ausubel *et to*., 1983, p. 46).

About the concepts learning, Ausubel explains that concepts can be acquired in two ways: Formation and Assimilation. In the formation of concepts, the attributes or characteristic of the concept are acquired through the direct experience, in successive stages of formulation and testing theories or hypothesis.

In case of the assimilation of concepts, it takes place as the child extends his vocabulary, since the concepts characteristics can be defined using the available combinations in his/her cognitive structure. In short, one defines the concepts as objects, situations or properties of which are designated by means of some symbol or signs. Therefore, we can infer that concepts learning is also representation learning.

As for learning of propositions it is deduced that it goes beyond the simple assimilation of what the words, combined or isolated represent, since it demands to receive the meaning of the ideas expressed as propositions. The propositions learning implies the combination and

relation of several words each of which constitutes a unit, then these get together in such a way that the resultant idea is more than the simple sum of the meanings of the individual component words, producing a new meaning that is assimilated to the cognitive structure. So, a potentially meaningful proposition, verbally expressed, as a statement that has a denoting meaning (the characteristics suggested when hearing the concepts) and connotative, (the emotions and attitudes caused by the concepts) of the involved concepts, will interact with the main ideas already established in the cognitive structure and from this interaction, the meanings of the new proposition arise.

From previously exposed, there arises the ideas of "Assimilation", defined by Ausubel as: "The process by means of which the new information is linked by main and pre-existing aspects of the cognitive structure and that changes the recently acquired information and the structure pre-existing too." (Ausubel et to., 1983:71). "This interaction process modifies both, the meaning of the new information and the meaning of the concept or proposition to which it is linked" (Ausubel *et to*.; 1983:118).

### 3.   Educational Decree Nº 220

This decree was promulgated on May 18, 1998 and it establishes the fundamental purposes and obligatory minimal contents of the high school in Chile.  This decree, in its VI Chapter establishes the main purposes for the technical education for high school, creating a curricular frame that arranges the specialties for economic sectors and defines them into a group of occupations that share common elements, this way also called "occupational family" (Decree Nº 220/1998, p 285-286). The aforesaid economic sectors are 13 and the specialties are 44.

### III. METHODOLOGY

### 1.   Research description

The present investigation is basic, sectional, observational, explanatory, micro-sociological, of mixed sources, quantitative. It is a field research, leading to a study of surveys and it is assigned to the line of investigation of learning kinds. (Sierra Bravo, 1997).

## 2. Investigation Hypothesis

**2.1 $H_i$**: "The learning kinds from the Ausubel's theory influence significantly ($\alpha = 0,05$) on the learning results – expressed in marks - of the students of technical high school, in the different specialties in which they are trained."

**2.2 Ho**: "The learning kinds from the Ausubel's theory do not influence significantly ($\alpha = 0,05$) on the learning results – expressed in marks - of the students of technical high school, in the different specialties in which they are trained."

## 3. Variables

**3.1. Learning kinds:** We've called learning kinds to the way that the apprentice processes the received information, according to Ausubel (2003). He classified them as: significant learning, discovery learning (guided and autonomous), and by heart learning.

**3.2. Specialties of Professional Training**: It is a group of occupations that share common elements of the so called "Occupational Family" that includes the Economic Sectors that come from the main purposes for the Technical high school in Chilean Education (Decree Nº 220/1998, pages 285-286).

**3.3. Marks**: The learning results will be codify according to the Regulation of marks and promotion according to Decree Nº 83/2001, in a scale that goes from 1.0 to 3.9 fail; 4,0 to 4.9 approved; 5,0 to 5.9 good; 6,0 to 7.0 very good.

## 4. Population and Sample

The school where this investigation was carried out currently has a registration of 1513 students from first to the fourth year of high school. The analysis units will be the students of third and fourth years, distributed as follows:

Sample size: The stratified random sample for finite universe was calculated on a N -721 representative of 220 women and 501 men, students from 9 courses equivalent to the first year of specialty and 9 courses of the second and last year of the specialty. Each group represents a specialty linked to an economic area, for example, Wardrobe - Textile Dressmaking; Administration – Trade; Pre-school - Social Programs, Constructions - Electricity and so on. Applied to sample error of 5% the probability of occurrence of the phenomenon of a 50% (p value), and a probability of nonoccurrence of the phenomenon of 50% (value q). A value Z = 1.96 representative one of 95% of certainty; a sample of 529 subjects of analysis is reached.

## 5. Instrument Description

The Test of Learning kinds, according to Ausubel's theory, TADA - DO2 (of 13 years in ahead), asses the types of learning in four cognitive processes: learning by heart, discovery guided learning, discovery autonomous learning and discovery meaningful learning. The examiner proposes four sub-tests of 15 questions each. The total Test involves 60 items. The TADA - DO2 works as a sieve, that is to say, it is an evaluation that allows knowing the achievement level as far as learning kinds of people from 13 years old in ahead, in relation to a statistical norm by gender, allowing declaring if this achievement is normal, or is under the expected level. The TADA - DO2 involves 60 items, organized in four sub-tests: the sub-test of learning by rote, the discovery guided learning, the sub-test of discovery autonomous learning and the discovery meaningful learning one.

The psychometric study of the Test of Learning based on the Ausubel's theory allows considering the reliability of TADA - DO2 in 0,911 by means of the Alpha of Cronbach.

## IV. ANALYSIS OF RESULTS

### 1. Gender Variable

The sample involves 529 individuals, 68.1% male and 31.9% female. They are distributed in 270 individuals (51%) who attend to the first year of technical high school and 259 pupils (49%) that study the second and last year of technical high school in a certain specialty.

### 2. Specialty Variable

The analysis of this variable allows knowing the distribution of the respondent students in the different specialties that the school offers.

- The management specialty has an absolute frequency of 73 individuals, corresponding to 13.8% of the relative total frequency;

- Industrial mechanical field has an absolute frequency of 71 individuals, corresponding to 13.4% of the relative total frequency;

- Automotive mechanics field has an absolute frequency of 68 individuals, corresponding to 12.9% of the total relative frequency , the same of the Construction specialty;

- Metallic constructions has a frequency of 65 individuals, corresponding to 12.3% of the relative total frequency;

- The electricity specialty has a frequency of 55 individuals, corresponding to 10.4% of the relative total frequency;

- The dressmaking specialty has a frequency of 51 individuals, corresponding to 9.6% of the relative total frequency;

- The Completions of Construction filed has a frequency of 46 individuals, corresponding to 8.7% the relative total frequency;

− The preschooler attendance field has an absolute frequency of 32 individuals, corresponding to 6.0% the relative total frequency.

## 3. Variable of learning kinds

− The Independent Discovery learning has an absolute frequency of 199 individuals, corresponding to 37.6% of the relative total frequency.

− The Meaningful Learning has an absolute frequency of 133 individuals, corresponding to 25.1% of the relative total frequency.

− Learning by rote has a frequency of 124 individuals, corresponding to 23.4% of the relative total frequency.

− The Guided Discovery Learning has an absolute frequency of 73 individuals, corresponding to 13.8% the relative total frequency.

More of the 60% of the respondent individuals are distributed between the Independent Discovery learning and the meaningful Learning, that is to say, nearly four (3.7) from ten students surveyed, show that the learning degree to acquire new concepts in its cognitive structure is not gravitating (Guided Discovery learning), as well, almost 3 (2,5) of 10 respondent pupils, are able to assimilate a new concept or a new information in their cognitive structure creating a solidification of the process of education through learning. As far as the other two learning kinds (by heart and Guided Discovery), in the first case it is possible to say that per each 10 people surveyed, 2.3 manages to strengthen the learning of new concepts or information in their cognitive structure through processes and strategies that are sustained on the memory mechanism. In the second case (Guided Discovery learning), we can see that per each 10 people surveyed, 1.4 of them manages to internalize the learning of a new information, but supported by a hard work of teachers.

### 4.  Variable of surveyed geographical origin

Considering the results of the analysis unit, the 59.4% corresponds to students whose address is located in an urban geographic zone; the other 40.6% of the surveyed ones are from addresses of countryside locations.

### 5.  Variable of economic tutor

It is stated that a 67.1% of the total of the students come from a family whose economic tutor is the father. In a second place the mother is the tutor, with a 27.4% and thirdly the grandparents (one or both) with a 2.3%.  It is remarkable the low percentage of cases, a 1.5%, in which both parents are economic tutors.

### 6.  Variable of the educational degree of the family tutor

It can be appreciated that the highest percentage, a 32.3%, of the surveyed shows that the educational degree of the family tutor has high school complete studies and immediately follows the degree to those with incomplete basic education, with a 22.1%, involving between both categories more of the 50% of  the total population.

### 7.  Householder variable

We can see that the 69.0% of the respondents ones say that the father is the householder and next, with a 23.1%, is the mother; between both they get a 92.1% of the total population.

### 8. Variable of family income

About this variable we can assert that in the highest percentage, 27.6%, the level of family income is between $0 and $56,481 Chilean pesos, secondly the income level that is between $149,387 and the $270,414, with a 25.9%. Between both, the 50% of the total of the

respondent ones are included, which shows that more than the half of the families of the surveyed has incomes that do not surpass the $270,414.

## 9. Age Variable

It is appreciated that the 45.4% of the respondent students are 17 years old. Secondly, those who are 18 with a 36.9%, both involving the 82.2% of the total surveyed population. The other 17.8%, excepting the two above-mentioned ages, are distributed between 16 years old (with a 16.1% maximum) and 21 (with a 0.2% minimum).

## 10. Variable of average marks in specialties

This variable was structured on the basis of the qualifications (averages) achieved by students in those subjects of the specialty that conforms the curriculum of the professional specialization, which allows to acquire the competitions to get the degree of professional technician. The obtained rank is of 3.3, 3.4 minimum and maximum of 6,7. The average qualifications is of 5.6, the median one is of 5.7, the mode is of 5.5 and its standard error is of 0,0221. The standard deviation is of 0.5073 and the variance of 0,257. A negative asymmetry value of -0,540 is estimated, that is to say, the classes display a Gaussian curve with a slant towards the left of the average. The kurtosis is of 0.447. It can be considered that the 90.7% of the respondent students has average qualifications of specialized training between 5.0 (five comma zero) and 7.0 (seven comma zero). The above mentioned indicates that as far as the average qualification of specialized training, the most of the respondent population (90.7%) has blue average grade and only the 0.4% of them has red average grade.

## 11. Learning kinds related to genders

The Chi square, finding a value of $x^2$ 18.471 with 1 degree of freedom, where p value is < 0.01, there is a bilateral asymptotic significance; which is interpreted as an association between learning by heart and the gender of the people under analysis. Learning by rote does not differ significantly from the gender variable, therefore Ho is rejected, meaning that both variables are associated, therefore, men and women achieve different levels in learning by heart.

The Chi square, finding a value $x^2$ 13.235 with 1 degree of freedom, where p value is < 0.01, there is a bilateral asymptotic significance; which is interpreted as an association between guided learning and the gender of the analysis units. Guided learning does not differ significantly from variable gender, therefore, the Ho is rejected, that is to say, both variables are associated, therefore men and women reach different levels in the guided learning.

The Chi-square, finding a value $x^2$ 3.080 with 1 degree of freedom, where p value is > 0.05 there is not a bilateral asymptotic significance; which means that there is no association between the type of independent learning and the gender of the analysis units. Independent learning differs significantly from variable gender, therefore, the Ho is accepted, that is to say, both variables are not dependent.

The Chi –square, finding a value $x^2$ 7.731 with 1 degree of freedom, where p value is < 0.01, there is a bilateral asymptotic significance; which is understood as an association between the learning kinds and gender. Meaningful learning does not differ significantly from variable gender, therefore, the Ho is rejected, that is to say, both variables are associates, therefore, men and women reach different levels in the meaningful learning.

## 12. Correlation factor between variables

When establishing the correlation of Spearman, in the entire unit of analysis (n - 529) for categorical variables between the tutor educational level and the results of basic training curriculum, there is a coefficient of positive correlation weak r = 0.122 (**). P < 0.01 the coefficient is significant (99% of confidence that the correlation is true). The variance of common factors is 1.5%, indicating the percentage of variation of a variable with respect to the variation of the other and vice versa.

The people under study were asked with respect to the number of books read in the last twelve months and the response was correlated to the learning kinds. The following findings are found out: Variable books read in the last 12 months with learning by heart, a coefficient r = 0.168 (**) with p 0.01 value < and a variance of common factors: 2.8%. Variable books read in the last 12 months with guided learning, a coefficient r = 0.123 (**) with p 0.01 value < and a variance of common factors: 1.5%. Books read in the last 12 months with the type of Independent learning r = 0.139 (**) with p 0.01 value < and variance of common factors: 1.9%. Books read in the last 12 months with the type of significant learning r = 0, 124 (**) with p 0.01 value < and a variance of common factors: 1.54%.

When calculating the correlation of Pearson, in the entire unit of analysis (n - 529) for variables of interval between the results of learning in the basic training curriculum and the levels of achievement of the curriculum of the specialized training professional, a coefficient of positive correlation weak r = 0.127 (**) is noticed. P < 0.01 the coefficient is significant (99% of confidence that the correlation is true). The variance of common factors is 1.6%. According to Creswell (2005) a correlation coefficient is important when it reaches coefficients of 0.30 or higher.

When crossing the variables age and learning kinds a significant correlation arises of p value < 0.01 with independent learning r = 0.141 and a variance of common factors of 2%. Between age and guided learning r = 0.109 (**), variance of common factors of 1.2%. The

age is correlated to the meaningful learning r = 0.124 (**), variance of common factors of 1.54%.

Between learning by rote and the guided learning, the correlation is r = 0.545 (**), with a variance of common factors of 29.7% and p value < 0,01.  Between the type of learning by heart and independent learning, the correlation = 0.499 is r (**), with a variance of common factors of 24.9% and p value < 0,01.  Between the type of learning by heart and meaningful learning the correlation = 0.540 is r (**), with a variance of common factors of 29.16% and p value < 0,01.  Between the type of guided learning and independent the correlation = 0.676 is r (**), with a variance of common factors of 45.7% and p value < 0,01.

Between the meaningful learning and independent the correlation = 0.633 is r (**), with a variance of common factors of 40.07% and p value < 0,01.  Between the meaningful learning and the guided the correlation is r = 0.648 (**), with a variance of common factors of 41.99% and p value < 0,01

## 13.  Industrial mechanical specialty

When applying the Kolmogorov - Smirnov test in a sample (n - 71) to marks of each sub-scale of TADA - DO2 Test, a bilateral asymptotic significance is observed $p \geq 0.05$ (0.246 average of grades of specialty, 0.577 in learning by rote, 0.377 in guided learning, 0.289 in independent learning and 0.336 in meaningful learning) indicating that the marks adjust to the distribution of a normal curve.

| Variable 1 | Variable 2 | r | Type of interrelation | Value p | Variance of Common factors |
|---|---|---|---|---|---|
| Learning by heart | Independent learning | 0,492 | Positive media | 0,01 | 24,21 % |
| Learning by heart | Guided learning | 0,489 | Positive media | 0,01 | 23 % |

| | | | | | |
|---|---|---|---|---|---|
| Independent learning | Guided learning | 0,651 | Positive media | 0,01 | 42,38 % |
| Learning by heart | Meaningful learning | 0,507 | Considerable media | 0,01 | 25 % |
| Meaningful learning | Guided learning | 0,559 | Considerable media | 0,01 | 31,24 % |
| Independent learning | Meaningful learning | 0,628 | Considerable media | 0,01 | 39,43 % |

Applied Pearson bi-variety correlation, we've found values p < 0.01 in the specialty of Industrial Mechanics. Consequently, the hypothesis is accepted with a 99% of certainty and the correlation is true.

## 14. Automotive Mechanics

When applying the Kolmogorov - Smirnov test in a sample (n − 68) to marks of each sub-scale of TADA - DO2 Test, a bilateral asymptotic significance is observed p ≥ 0.05 (0.097 average of grades of specialty, 0.729 in learning by heart, 0.936 in guided learning, 0.553 in independent learning and 0.478 in significant learning) indicating that the marks adjust to the distribution of a normal curve.

| Variable 1 | Variable 2 | r | Type of interrelation | Value p | Variance of Common factors |
|---|---|---|---|---|---|
| Learning by heart | Independent learning | 0,398 | Positive media | 0,01 | 15,84 % |
| Learning by heart | Meaningful learning | 0,394 | Positive media | 0,01 | 15,52 % |
| Learning by heart | Guided learning | 0,498 | Positive media | 0,01 | 24 % |
| Independent learning | Meaningful learning | 0,593 | Considerable media | 0,01 | 35,16 % |

| | | | | | |
|---|---|---|---|---|---|
| Guided learning | Independent learning | 0,649 | Considerable media | 0,01 | 42,12 % |
| Guided learning | Meaningful learning | 0,633 | Considerable media | 0,01 | 40,06 % |

Applied the Pearson bi-variety correlation, we've found values p < 0.01 in the specialty of Automotive Mechanics. Consequently, the hypothesis is accepted with a 99% of certainty and the correlation is true.

## 15. Electricity

When applying the Kolmogorov - Smirnov test in a sample (n - 55) to marks of each sub-scale of TADA - DO2 Test, a bilateral asymptotic significance is observed $p \geq 0.05$ (0.393 average of specialty marks, 0.626 on learning by heart, 0.758 in guided learning, 0.820 and 0.486 in autonomous learning in meaningful learning) indicating that the scores are consistent with the distribution of a normal curve.

| Variable 1 | Variable 2 | r | Type of interrelation | Value p | Variance of Common factors |
|---|---|---|---|---|---|
| Learning by heart | Guided learning | 0,442 | Positive media | 0,01 | 19,53 % |
| Learning by heart | Independent learning | 0,450 | Positive media | 0,01 | 20 % |
| Learning by heart | Meaningful learning | 0,477 | Positive media | 0,01 | 22,75 % |
| Holding a permit learning | Independent learning | 0,641 | Considerable media | 0,01 | 41,08 % |
| Guided learning | Meaningful learning | 0,661 | Considerable media | 0,01 | 43,69 % |
| Independent learning | Meaningful learning | 0,738 | Considerable media | 0,01 | 54,46 % |

Applied the Pearson bi-variety correlation, we've found values $p < 0.01$ in the electricity specialty. Consequently, the hypothesis is accepted with a 99% of certainty and the correlation is true.

## 16. Construction

When applying the Kolmogorov - Smirnov test in a sample (n - 68) to marks of each sub-scale of TADA - DO2 Test, a bilateral asymptotic significance is observed $p \geq 0.05$ (0.105 average of specialty marks, 0.604 learning by rote, 0.793 in guided learning, 0.415 in independent learning and 0.889 in meaningful learning) indicating that the scores adjust to the distribution of a normal curve.

| Variable 1 | Variable 2 | r | Type of interrelation | Value p | Variance of Common factors |
|---|---|---|---|---|---|
| Guided learning | Specialty marks | 0,286 | Positive media | 0,05 | 8,2 % |
| Autonomous learning | Specialty marks | 0,262 | Positive media | 0,05 | 6,86 % |
| Meaningful learning | Specialty marks | 0,250 | Positive media | 0,05 | 6,25 % |
| Learning by heart | Guided learning | 0,558 | Considerable media | 0,01 | 31,13 % |
| Learning by heart | Independent learning | 0,576 | Considerable media | 0,01 | 33,17 % |
| Learning by heart | Meaningful learning | 0,515 | Considerable media | 0,01 | 26,52 % |
| Guided learning | Independent learning | 0,743 | Considerable media | 0,01 | 55,20 % |
| Guided learning | Meaningful learning | 0,652 | Considerable media | 0,01 | 42,51 % |
| Independent learning | Meaningful learning | 0,691 | Considerable media | 0,01 | 47,74 % |

Applied the Pearson bi-variety correlation, we've found values p and of p< 0.01 in the construction specialty. Consequently the hypothesis is accepted with a 95% of certainty and other correlations are true with a 99 % of security.

## 17. Completions of construction

When applying the Kolmogorov - Smirnov test in a sample (n - 46) to marks of each sub-scale of TADA - DO2 Test, a bilateral asymptotic significance is observed $p \geq 0.05$ (0.476 average of specialty marks, 0.475 in learning by heaert, 0.941 in guided learning, 0.403 in independent learning and 0.476 in meaningful learning) indicating that the scores adjust to the distribution of a normal curve.

| Variable 1 | Variable 2 | r | Type of interrelation | Value p | Variance of Common factors |
|---|---|---|---|---|---|
| Learning by heart | Guided learning | 0,544 | Considerable media | 0,01 | 29,59 % |
| Learning by heart | Autonomous learning | 0,472 | Positive media | 0,01 | 22,27 % |
| Learning by heart | Significant learning | 0,596 | Considerable media | 0,01 | 35,52 % |
| Guided learning | Autonomous learning | 0,515 | Considerable media | 0,01 | 26,52 % |
| Guided learning | Significant learning | 0,536 | Considerable media | 0,01 | 28,72 % |
| Autonomous learning | Significant learning | 0,672 | Considerable media | 0,01 | 45,15 % |

Applied the Pearson bi-variety correlation, we've found values $p < 0.01$ in the specialty of Completions of Construction. Consequently the hypothesis is accepted with a 99% of certainty and the correlation is true.

## 18. Metallic Constructions

When applying the Kolmogorov - Smirnov test in a sample (n - 65) to marks of each sub-scale of TADA - DO2 Test, a bilateral asymptotic significance is observed $p \geq$ (0.409 average of specialty marks, 0.807 in learning by rote, 0.527 in guided learning, 0.595 in independent learning and 0.463 in meaningful learning) with 65 0.05 degrees of freedom, indicating that the scores adjust to the distribution of a normal curve.

| Variable 1 | Variable 2 | r | Type of interrelation | Value p | Variance of Common factors |
|---|---|---|---|---|---|
| Learning by heart | Guided learning | 0,626 | Considerable media | 0,01 | 39,19 % |
| Learning by heart | Independent learning | 0,593 | Considerable media | 0,01 | 35,16 % |
| Learning by heart | Significant learning | 0,735 | Considerable media | 0,01 | 54,02 % |
| Guided learning | Independent learning | 0,720 | Considerable media | 0,01 | 51,84 % |
| Guided learning | Significant learning | 0,724 | Considerable media | 0,01 | 52,42 % |
| Guided learning | Significant learning | 0,557 | Considerable media | 0,01 | 31,02 % |

Applied the Pearson bi-variety correlation, we've found values $p < 0.01$ in the specialty of Metallic Constructions. Consequently the hypothesis is accepted with a 99% of certainty and the correlation is true.

## 19. Dressmaking

When applying the Kolmogorov - Smirnov test in a sample (n - 51) to marks of each sub-scale of TADA - DO2 Test, a bilateral asymptotic significance is observed $p \geq 0.05$ (0.371 average of specialty marks, 0.192 in learning by heart, 0.795 in guided learning, 0.429 in independent

learning and 0.372 in meaningful learning) indicating that the scores adjust to the distribution of a normal curve.

| Variable 1 | Variable 2 | r | Type of interrelation | Value p | Variance of Common factors |
|---|---|---|---|---|---|
| Learning by heart | Guided learning | 0,465 | Positive media | 0,01 | 21,62 % |
| Learning by heart | Significant learning | 0,521 | Considerable media | 0,01 | 27,14 % |
| Learning by heart | Learning Autonomous | 0,357 | Positive media | 0,05 | 12,74 % |
| Guided learning | Independent learning | 0,651 | Considerable media | 0,01 | 42,38 % |
| Independent learning | Significant learning | 0,687 | Considerable media | 0,01 | 47,19 % |
| Guided learning | Significant learning | 0,764 | Considerable media | 0,01 | 58,37 % |

Applied the Pearson bi-variety correlation, we've found values $p < 0.01$ in the dressmaking specialty. Consequently the hypothesis is accepted with a 99% of certainty and the correlation is true.

## 20. Preschool attendance

When applying the Kolmogorov – Smirnov test in a sample (n - 32) to marks of each subscale of Test TADA - DO2, a bilateral asymptotic significance $p \geq 0.05$ with 32 degrees of freedom is observed (0.241 average of specialty marks; in learning by heart 0,585; guided learning 0,308; independent learning 0.282 and 0.525 in meaningful learning) indicating that the scores adjust to the distribution of a normal curve.

| Variable 1 | Variable 2 | r | Type of interrelation | Value p | Variance of Common factors |
|---|---|---|---|---|---|
| Independent learning | Specialty marks | 0,521 | Considerable positive | 0,01 | 27,14 % |

| | | | | | |
|---|---|---|---|---|---|
| Learning by heart | Guided learning | 0,649 | Considerable positive | 0,01 | 42,12 % |
| Learning by heart | Independent learning | 0,40 | Positive media | 0,05 | 16 % |
| Holding a permit learning | Significant learning | 0,713 | Considerable positive | 0,01 | 50,83 % |
| Learning by heart | Significant learning | 0,641 | Considerable positive | 0,01 | 41,08 % |
| Holding a permit learning | Independent learning | 0,785 | Very Strong positive | 0,01 | 61,62 % |
| Independent learning | Significant learning | 0,505 | Considerable positive | 0,01 | 25,50 % |

Applied the Pearson bi-variety correlation, we've found values  p < 0.05 and of p< 0.01 in the Preschool specialty.  Consequently the hypothesis is accepted with a 95% of certainty and other correlations are true with a 99 % of security.

## 21.  Management

When applying the Kolmogorov – Smirnov test in a sample (n - 73 to marks of each subscale of Test TADA - DO2,  a bilateral asymptotic significance p ≥ 0.05 is observed (0.263 average of specialty marks; 0,410 in learning by heart; 0,944 in guided learning; 0,880 in independent learning and 0.754 in meaningful learning) indicating that the scores adjust to the distribution of a normal curve.

| Variable 1 | Variable 2 | r | Type of interrelation | Value p | Variance of Common factors |
|---|---|---|---|---|---|
| Learning by heart | Guided  learning | 0,557 | Considerable positive | 0,01 | 31,02 % |
| Learning by heart | Independent learning | 0,575 | Considerable positive | 0,01 | 33,06 % |
| Learning by heart | Significant learning | 0,543 | Considerable positive | 0,01 | 29,49 % |
| Holding a permit learning | Independent learning | 0,681 | Considerable positive | 0,01 | 46,38 % |

| Holding a permit learning | Significant learning | 0,604 | Considerable positive | 0,01 | 36,48% |
|---|---|---|---|---|---|
| Autonomous learning | Significant learning | 0,626 | Considerable positive | 0,01 | 39,19 % |

Applied the Pearson bi-variety correlation, we've found values $p < 0.01$ in the management specialty. Consequently the hypothesis is accepted with a 99% of certainty and the correlation is true.

## V. CONCLUSIONS

From the successes it can be asserted from the null hypothesis, that there is a meaningful association ($\alpha = 0,05$) between the learning kinds and the expected learning of the professional training curriculum, as much for men and women, in all the specialties analyzed in this investigation. Achieve that the education of technicians leads to a successful employment is a complex task for teachers that try to handle scholar curriculum from the classroom.

Considering the gender, the representative majority is assigned to men, and although the economic areas and specialties of the Professional Technical Education does not discriminate genders, actually due to culture and tradition, there are some specialties like Preschool assistant, usually chosen by women.

A 49% of the population is in the second and last year of technical training and a 51% is attending to the first year. On the other hand, more of 60% of the analysis unit is distributed between Independent discovery learning and meaningful earning, that is to say, per each 10 students, almost four of them (3,7) show that the level of teaching to acquire new concepts in their cognitive structure is not the main cause (Guided Discovery Learning). In the same way, almost 3 (2,5) of 10 surveyed, can assimilate a new concept or a new information in their

cognitive structure creating a strengthen of the process of education through meaningful Learning. This lets to suggest the teachers, to include in their curriculum, the didactic strategy of auto-learning, fitting the activities to the learning kinds of the students.

A reduced percentage of the population is identified with rote learning characteristics, on the one hand, and of inductive reasoning by another one, that is to say, the capacity to learn by rote with the capacity to make general conclusions from certain data. A 59.4% correspond to those individuals whose address is located in the urban zone and the other 40.6% of the respondents are located in the countryside.

As far as the economic tutor, the 67.1% of surveyed population come from a family whose economic tutor is the father. Secondly, we can find the mother with a 27.4% and at last the grandparents (one or both) with a 2.3%. %. It is remarkable the low percentage of cases, a 1.5%, in which both parents are economic tutors. Besides their scholar degree is of a 32.3% with complete high school (first majority) and of a 22.1% with incomplete basic education (second majority).

About family incomes, the first majority reaches a level that goes from $ 0 to $ 56,481 with a 27.6%, after the income level that goes from $149,387 to $270,414, with a 25.9%. They both are the 50% of the surveyed population, which demonstrates that more than the half of the families of our sample has incomes that do not exceed $270.414.

As far as the age of the respondent ones, a 45.4% of them are 17 years old. Secondly there are those who are 18 with a 36.9%, involving between both ages the 82.2% of the entire population surveyed. The other 17.8%, excepting the two above-mentioned ages, are distributed between 16 years old (with a 16.1% maximum) and 21 (with a 0.2% minimum). The average age of men is of 17.21 years old and 17.32 in women.

As far as the average of the curriculum specialty (differentiated training) a 90.7% includes those respondent students whose average mark is between 5.0 (five comma zero) and 7.0

(seven comma zero). Above-mentioned shows that in the case of the average mark of differentiated training, the most of the respondent population (99.6%) has blue average mark and only a very small part (0.4%) of them has red average.

Of a total of 529 subjects of both sexes, bilateral statistically significant nonparametric correlation is observed, when applying the Rho de Spearman test, in the categorical variables, it results: Familiar income with the educational level of the tutor, an average positive coefficient of 0.178 with p value < 0,01. Between the Learning by rote and book reading in the last twelve months, an average positive value of 0.144 with p is obtained and a value < 0,01. In the case of the guided learning with books reading in the last twelve months, it is stated a correlational value of 0.104 weak positive with bilateral significance p value < 0,05. When relating guided learning to learning by rote, it verifies a value 0.413 positive average, with p value < 0,01. When considering the Independent Learning with the learning by rote, it verifies a value 0.361 positive average, with p value < 0,01. As far as the Guided Learning related to the Independent one, it verifies a considerable positive value 0.571, with p value < 0.01. The Independent Learning related to books read in the last twelve months states a correlation value of 0.23 positive with bilateral significance p value < 0.01. The meaningful Learning related to Books read in the last twelve months proves a correlation value of 0.104 weak positive with bilateral significance p value < 0.05. When affecting the Significant Learning with the Rote it reaches a value of 0.438 positive media, with p value < 0.01. When disturbing the meaningful learning with the Guided it collates a considerable positive value 0.524, with p value < 0.01. When correlating meaningful learning with the independent one it is a considerable positive value 0.507, with p value < 0.01. When analyzing qualitatively the variables there is not found any relation between with the average marks of the differentiated professional training and any learning kind.

The parametric correlation of Pearson to determine the level of dependency of the variables of interval with normal distribution, in all the subjects of analysis shows that: When affecting the guided learning with the learning by rote it arises a value 0,545 with a considerable positive correlation, with p value < 0.01 indicating reliably (99%) the dependency between both variables is true. The variance r2 of common factors, points out the percentage of variation of a variable due to the variation of the other one.  Consequently the guided learning explains in a 29.7% of the cases the Learning by rote and vice versa.

When relating the Independent Learning to the rote there is a value 0,499 giving rise to a positive correlation media, with p value < 0.01 indicating reliably (99%) that the dependency between both variables is true. The variance r2 of common factors shows that the Independent Learning explains in a 24.9% the learning by rote and vice versa.

When establishing dependency between the Independent Learning and the guided one, it verifies a value 0,676, giving rise to a type of considerable positive correlation, with p value < 0.01 asserting reliably (99%) that the dependency between both variables is true.  The variance r2 of common factors, points out that Independent Learning explains in a 45.7% the Guided Learning and vice versa.

The dependency between meaningful Learning and the rote one verifies a value  0,540 giving rise to a considerable positive correlation, with p value < 0.01 showing reliability (99%) that the dependency between the variables is true.  The variance r2 of common factors, points out that meaningful Learning explains in a 45.7% the Rote Learning and vice versa.

The relation between meaningful learning with the guided verifies a value  0,648 giving rise to a type of considerable positive correlation, with p value < 0.01 showing reliability (99%) that the dependency between both variables is true.  The variance r2 of common factors, it points out that meaningful learning explains in a 41.99% the Guided Learning and vice versa.

The correspondence between the meaningful learning with the independent one verifies a value 0,633 giving rise to a considerable positive correlation, with p value < 0.01 pointing out reliability (99%) that the dependency between both variables is true. The variance of common factors demonstrates that the meaningful learning explains in a 40.06% the Independent Learning and vice versa.

When applying the Pearson's statistician of correlation bi-varied values p < 0.01 were found in the specialty of Automotive and Industrial Mechanics, between learning kinds. Consequently the hypothesis is accepted with a 99% of certainty and the correlation is true. The grades of the differentiated plan do not explain any type of learning in this specialty.

In the specialty of Construction, when applying the Pearson's statistician of correlation bivaried there were values p < 0.05 between the guided learning, independent and meaningful learning with the average grades of the curriculum specialty and; p< 0.01 between learning kinds. Consequently it is accepted with 95% certainty the hypothesis and with 99% certainty that the correlation is true.

When applying the Pearson's statistician of correlation bi-varied values p < 0.01 were found in the specialty of Completions of Construction, among the learning kinds. Consequently the hypothesis is accepted with a 99% of certainty and besides, the correlation is true. We haven't found dependency in this specialty of learning kinds with the average marks of the differentiated curriculum professional training.

When applying the Pearson's statistician of correlation bi-varied values p < 0.01 were found in the specialty of Metallic Constructions. Consequently the hypothesis is accepted with a 99% of certainty and the correlation is true. The qualification variable of the curriculum in this specialty does not vary any learning kind.

Values p < 0.01 were found in the Clothes specialty and Textile Preparation. Consequently the hypothesis is accepted with a 99% of certainty and besides the correlation is true. The qualification variable of the curriculum in this specialty does not vary any learning kind.

We've found values p < 0,05 y de p< 0,01 in the preschooler attendance. Consequently the hypothesis is accepted with a 99% of security and with a 95% of certainty we can assert that the correlation is true. There is 95% dependency among the variables independent learning and rote learning with average grades at the curriculum of professional training.

With the bi-varied correlation of Pearson, we've found values p < 0.01 in the specialty of Administration. Consequently the hypothesis is accepted with a 99% of certainty and besides the correlation is true. The qualification variable of this specialty does not vary any learning kind.

The statistical of regression for all the units of analysis, shows to a multiple regression of 0.157 R = and a R2 that demonstrates that the learning kinds and age explain as a whole a 2.5% to the dependent factor average marks of the curriculum differentiated for the professional training. The *Anova* indicates that the sum of squares of regression 13.119 with 5 degrees of freedom reaches a quadratic average of 2,624. Calculated value F 2.66 reaches a significance with p value < 0,05; a statistical importance in the type of independent learning with a value is observed between the predicting variables p < 0,05.

In men (n -359) coefficient R = 0.184 with percentage of explanation of a 3.4% of the learning kinds (R2 0.034). The *Anova* indicates a calculated value F 2.48 with p value < 0.05 (0,032). The variables age (0,046) and independent learning are statistically important (0,014).

No statistical significant element is observed in the summary of the model in the female gender.