Reception: **February 23, 2024** | Acceptance: **May 13, 2025** | Publication: **June 1, 2025**

Identification of reflective students in higher education institutions in Mexico

—

Manuel de Jesús Moguel Liévano[1]
manuel.moguel@unach.mx • ORCID: 0000-000-3-3650-5038

Oscar Ausencio Carballo Aguilar[2]
oscar.carballo@unach.mx • ORCID: 0000-0002-4868-7484

Luis Alejandro Trujillo Santos[1]
ltsantos@unach.mx • ORCID: 0000-0003-3106-0922

Roger Irán Gordillo Rodas[1]
ORCID: 0009-0007-6047-8101

Enrique Gutiérrez Espinosa[1]
ORCID: 0000-0002-2214-9098

1 Facultad de Contaduría y Administración C-I, Universidad Autónoma de Chiapas. Tuxtla Gutiérrez, Chiapas México

2 Centro de Estudios para el Desarrollo Municipal y Políticas Públicas, Universidad Autónoma de Chiapas. Tuxtla Gutiérrez, Chiapas México

To quote this article:
Moguel Liévano, M. de J., Carballo Aguilar, O. A., Trujillo Santos, L. A., Gordillo Rodas, R. I., & Gutiérrez Espinosa, E. Identificación de estudiantes reflexivos en las instituciones de educación superior en México. *Espacio I+D, Innovación más Desarrollo, 14*(41). https://doi.org/10.31644/IMASD.41.2025.a05

— Abstract—

The following article, *Identification of reflective students in higher education institutions in Mexico*, has an added value emanated from the research on *Reflective learning in higher education students in Mexico*, led by the academic group "*Studies in innovative organizational practices*" with the collaboration of the Research Network, *Organizational and business development*, in the period between 2022 and 2023, to a population of 2,172 students (44% female, and 56% male), with an age range of 18 to 26 years, who were enrolled in eleven educational programs, from six higher education institutions in Mexico (FCyA CI and FI of the Autonomous University of Chiapas (UNACH) and ITTG, in Chiapas; ITCJ and UTCJ in Ciudad Juarez, Chihuahua; and the UAEMex, in the State of Mexico). Results demonstrate that from the study participants, only one student was highly reflective when answering the first six questions of the questionnaire. The said respondent was male and enrolled in the fourth semester of the Bachelor's Degree in Computer Systems at the Accounting and Administration Faculty (FCyA), Campus I of the UNACH. Employing variable data analysis, we found that only a few students managed to answer up to question four, and on occasions up to question five. It is important to note these results to comply with the intended objectives.

The results of the statistical analysis of the "gender variable" with the "reflective responses variable" of question 1 support the research hypothesis with a confidence level of 95%. Thus, the relationship between the variables is significant; it is concluded that the reflective responses provided by the members of the sample group do have a significant relationship with their gender.

Keywords:

Learning; reflection; reflective students; reflective thinking; HEI..

This work is a continuation of the research on Reflective Learning among Higher Education Students in Mexico, carried out by the Academic Body "Study of Innovative Organizational Practices", attached to the Faculty of Accounting and Administration C-I (FCyA C-I) of the Universidad Autónoma de Chiapas (UNACH), in collaboration with the Research Network "Organizational and Business Development" based at the Instituto Tecnológico de Ciudad Juárez, Chihuahua, during March 2022 to September 2023, in which six Higher Education Institutions (HEIs) participated, the results of which were presented in the final report to the General Directorate of Research and Postgraduate Studies of the UNACH.

The main objective of the aforementioned research was to know to what extent higher education students in Mexico make use of reflective processes in their learning strategies during their professional training, given that, according to the literature consulted for the construction of the theoretical framework, the reflective moment seems to be a different stage and perhaps superior to the types of learning by reasoning and rote, without detracting from the importance they have in the learning processes in all areas of knowledge.

As an instrument for collecting empirical data, a questionnaire created in 2003 was used to investigate organizational learning within the framework of the completion of the doctoral thesis *Organizational Learning: Nature, Evolution, and Perspectives, a case study in four organizations in Mexico* (Moguel, 2003) in the Graduate Course in Organizational Studies at the Universidad Autónoma Metropolitana Campus Iztapalapa, in which how people learn in the organizational environment was examined, where the hypothesis was that three types of learning can occur: memoristic (ontic), reasoning (ontological), and reflective (epistemic), and for its application in research on reflective learning in university studies, the pertinent adaptations were carried out.

In the case of research on reflective learning in higher education students in Mexico, the following HEIs participated; the Faculty of Accounting and Administration C-I (FCyA C-I) of the Universidad Autónoma de Chiapas (UNACH), the Instituto Tecnológico de Ciudad Juárez (ITCJ), Chihuahua, the Instituto Tecnológico de Tuxtla Gutiérrez (ITTG), Chiapas, the Universidad Autónoma del State of Mexico (UAEmex), the Universidad Tecnológica de Ciudad Juárez (UTCJ), Chihuahua, and the Faculty of Engineering (FI) of the Universidad Autónoma de Chiapas.

The bachelor's degrees or educational programs included are: Civil Engineering (IC), Electromechanical Engineering (IEM), Business Management Engineering (IGE), Logistics Engineering (IL), Computer Systems Engineering (ISC), Industrial Engineering (II), Mechanical Engineering (IM), Bachelor's Degree in Administration (LA), Bachelor's

Degree in Accounting (LC), Bachelor's Degree in Tourism Management (LGT), and Bachelor's Degree in Computer Systems (LSC); eleven in total, seven from the engineering area and four from the administrative-accounting area.

The observed population was 2172 students; of these, 982 (44.3%) are women and 1210 (55.7%) are men, from the aforementioned HEIs and educational programs.

The data collection instrument used contains 24 questions; the first six are multiple-choice, and questions seven through 24 are structured on a Likert scale. The work presented here explores only the behavior of the first six questions, which consist of a reflective option, a reasoning option and two memory options, prepared taking into account the theoretical contributions of the authors consulted with the characteristics of reflective people, both in the organizational learning thesis (Moguel, 2003) and in the research of reflective learning in HEIs in Mexico. So, what we are interested in is knowing how many students in the population answered the reflective options in each question, and thus determine which of them are reflective in their professional studies and surely in the other roles of their lives.

Reliability of the research instrument

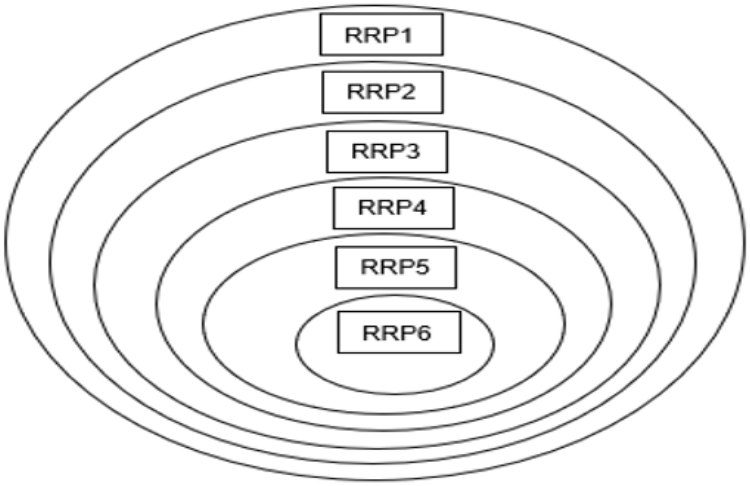
In relation to the reliability of the research instrument, we have the following: the Cronbach's Alpha coefficient obtained for the complete questionnaire in the SPSS program is 0.888 with 18 elements, a result that, according to the theory in the field, can be qualified as an instrument of high reliability. The 18 elements refer to the items in the Likert scale - from question seven to question 24 - with which this scale works. To determine the reliability of questions one to six, the object of this study, we proceeded to their statistical calculation in Excel with the 2172 records of the original study, obtaining a reliability of 0.60, which is considered reliable. In addition, the application of the instrument at two different times, the data concerning cognitive moments are as follows: memory (2003, 14%; 2023, 18%), reasoning (2003, 74%; 2023, 68%), and reflection (2003, 12%; 2023, 14%), a situation that reflects a fairly consistent behavior with twenty years of difference in its application. Therefore, the research instrument can generally be considered to be reliable according to Hernandez et. al (2014).

With the arguments set out above and following Hernández et. al. (2014), it can be said that the research instrument applied in both studies, both in the original work of 2003 and for the research of reflective students in the year 2023, shows an acceptable internal consistency.

II. METHOD

To carry out this study in the field of qualitative tradition, although a statistical analysis section is included that suggests a mixed-cut research, a filtering methodology was developed in each question, that is, taking as its main input the database of 2172 records in the Excel program of the original study and using the filters in each item, a sieve of reflective answers is carried out in question one; from that set of reflective answers the reflective answer of question two is filtered; from that set of reflective answers the reflective answer of question three is filtered, from that set of reflective answers the reflective answer of question four is filtered, from that set of reflective answers the reflective answer of question five is filtered, and finally, from that set of reflective answers the reflective answer of question six is filtered.

The following figure makes this procedure visible from set theory, where RRP means reflective answer per question.



Note: Own elaboration.

Figure 1. Reflective answer sets from question 1 to question 6

To operationalize this process, a method called "Reflective Answer Line" is established in which the first six questions of the questionnaire are represented with the initials P1, P2, P3, P4, P5, and P6 -preposing at the beginning of the line, before P1, the corresponding sample of the variable under analysis- in which the number of reflective answers in each of the questions is indicated, and as can be assumed, the reflective answers are drastically decreasing from question 1 to question 6, as will be observed in the subsequent analyses; being precisely this phenomenon what we are interested in studying: how many students are reflective in each of the variables, it is even possible to identify said students to know their qualities and study

habits that make them a highly reflective student, according to our analysis instrument. Diagram 1 illustrates this procedure.

(Sample)						
Answers Reflective	P1	P2	P3	P4	P5	P6

Note: Own elaboration.

Diagram 1. Reflective Response Line

Next, the identification analysis of reflective students is carried out on the main variables established, such as: study of the total population, institutions of higher education (HEIs), educational programs, and gender; in all cases, the observations are made via the filters of reflective responses indicated above.

1. Analysis of the total population of the original study, 2172 students

Under the filtration methodology explained above, of the total population of 2172 students from the six participating HEIs between November 2022 and May 2023, the following results are found:

For question 1, there were 540 reflective answers (25%).
For question 2, there were 222 reflective answers (41%).
For question 3, there were 83 reflective answers (37%).
For question 4, there were 23 reflective answers (28%).
For question 5, there were 7 reflective answers (30%).
For question 6, there was 1 reflective answer (14%).

Using the answer row, we have the following representation.

(Sample) (2172)						
	P1	P2	P3	P4	P5	P6
Answers Reflective	540	222	83	23	7	1

Note: Own elaboration.

Diagram 2. Reflective response row for the total population

This means that of the total sample of 2172 students:

- 540 answered the reflective option in question 1; of them...
- 222 answered the reflective option of question 2; of them...
- 83 answered the reflective option of question 3; of them...
- 23 answered the reflective option of question 4; of them...

- 7 answered the reflective option of question 5; and of them...
- 1 answered the reflective option of question 6.

Since the study makes it possible to identify the student in all his or her qualities, and in order to preserve his or her identity, only general information is referred to. The person who answered the six reflective answers is a male student, studying the fourth semester of the Bachelor's Degree in Computer Systems, in the FCyA C-I of the UNACH, a situation that allows us to monitor his school performance in the subsequent cycles.

The seven students who gave reflective answers to question five have the following characteristics:

HIEs	Bachelor's Degree	Semester	Gender	Age
UTCJ	ISC	5	M	19-22
FCA	LC	9	M	19-22
FCA	LSC	9	M	23-25
FCA	LA	9	F	23-25
FCA	LA	9	F	19-22
FCA	LSC	4	M	19-22
FCA	LGT	9	M	23-25

The table of data shows that of the seven students; one belongs to the Universidad Tecnológica de Ciudad Juárez, enrolled in the PE of Engineering in Computer Systems, fifth semester, male; and six belong to the Faculty of Accounting and Administration C-I of the Universidad Autónoma de Chiapas, of which two are enrolled in the Bachelor's Degree in Administration, two in the Bachelor's Degree in Computer Systems, one in the Bachelor's Degree in Accounting and one in the Bachelor's Degree in Tourism Management; five of them are in the ninth semester and one in fourth; four are male and two are female, information that seems relevant to us to affirm that graduates of the educational programs of the FCyA C-I of the UNACH show an important reflective component.

With the same procedure, the analysis of the research variables continues, namely: HEIs, bachelor's degrees or educational programs, and gender

2. Higher Education Institutions Analysis

We proceed to do a study on the HEIs.

2.1) UNACH's Faculty of Accounting and Administration C-I, whose sample amounts to **1196** students, with the following results.

For question 1, we found 291 reflective answers (24%); for question 2, we found 121 (42%); for question 3, we found 43 (35%); for question 4, 13 were found (30%); for question 5, 6 were found (46%); and for question 6, 1 was found (17%). The graphical representation of the answer row is as follows.

(Sample) (1196)	P1	P2	P3	P4	P5	P6
Answers Reflective	291	121	43	13	6	1

Note: Own elaboration.

Diagram 3. Reflective response row for the sample of the UNACH's FCyA C-I

Six students answered the reflective responses up to question five, plus the student who answered up to question six, whose characteristics coincide with the information of the FCyA C-I students who appear in the previous analysis; therefore, their identification is obviated.

2.2) Instituto Tecnológico de Ciudad Juárez, Chihuahua (ITCJ), whose sample amounts to 537 students, with the following results.

For question 1, we found 135 reflective responses (25 %); for question 2, we found 50 (37 %); for question 3, we found 21, (42 %); for question 4, we found 6, (28 %); for question 5, we found 0; for question 6, we found 2. The graphical representation of the answer row is as follows.

(Sample) (537)	P1	P2	P3	P4	P5	P6
Answers Reflective	135	50	21	6	0	2

Note: Own elaboration.

Diagram 4. Reflective Response row for the ITCJ sample

In this ITCJ exercise, six students answered reflectively up to question four; in question five there are zero reflective answers, however, in question six there are two reflective answers, these students have the following characteristics: both are male, one from the administration degree, eighth semester; and one more from the ninth semester of electromechanical engineering.

2.3) Instituto Tecnológico de Tuxtla Gutiérrez, Chiapas (ITTG), whose sample amounts to 121 students, with the following results.

For question 1, we found 39 reflective answers (32%); for question 2, we found 18 (46 %); for question 3, we found 3 (17 %); for questions 4, 5, and 6, we found 0 reflective answers.

The graphical representation of the answer row is as follows.

(Sample) (121)	P1	P2	P3	P4	P5	P6
Answers Reflective	39	18	3	0	0	0

Note: Own elaboration.

Diagram 5. Reflective Response row for the ITTG sample

Three students gave reflective answers up to question three; there are no reflective answers to questions four, five, and six.

2.4) Universidad Autónoma del Estado de México (UAEMex), whose sample amounts to 119 students, with the following results.

For question 1, we found 35 reflective answers (29%); for question 2, we found 18 (51%); for question 3, we found 10 (55%); for question 4, we found 1 (10%); for questions 5 and 6, we did not find any reflective answers. The graphical representation of the answer row is as follows.

(Sample) (119)	P1	P2	P3	P4	P5	P6
Answers Reflective	35	18	10	1	0	0

Note: Own elaboration.

Diagram 6. Reflective answers line for the UAEMex sample

One male student gave reflective answers up to question four; he is enrolled in the tenth semester of the Computer Systems Engineering program.

2.5) Universidad Tecnológica de Ciudad Juárez, Chihuahua (UTCJ), whose sample amounts to 113 students, with the following results.

For question 1, we found 25 reflective answers (22%), for question 2, we found 11 (44%); for question 3, we found 4 (36%); for question 4, we found 2 (50%); for question 5, we found 1 (50%); for question 6, we didn't find any reflective answers.

The graphical representation of the answer row is as follows.

(Sample) (113)	P1	P2	P3	P4	P5	P6
Answers Reflective	25	11	4	2	1	0

Note: Own elaboration.

Diagram 7. Reflective response row for the UTCJ sample

One male student gave reflective answers up to question five; he is enrolled in the fifth semester of the Computer Systems Engineering program.

2.6) Facultad de Ingeniería FI de la Universidad Autónoma de Chiapas, whose sample amounts to 81 students, with the following results.

For question 1, we found 15 reflective answers (18%); for question 2, we found 4 (27%); for question 3, we found 2 (50%); for question 4, we found 1 (50%); for questions 5 and 6, we didn't find any reflective answers. The graphical representation of the answer row is as follows.

(Sample) (81)	P1	P2	P3	P4	P5	P6
Answers Reflective	15	4	2	1	0	0

Note: Own elaboration.

Diagram 8. Reflective response row for the UNACH FI sample

One male student gave reflective answers up to question four; he is enrolled in the first semester of the Civil Engineering PE.

3. Analysis by Bachelor's Degree or Educational Program

As mentioned since the beginning of this work, the number of educational programs or bachelor's degrees in analysis adds up to eleven, seven from the field of engineering and four from the area of accounting-administrative sciences. However, since the exercise of answering all the reflective answers of the six questions under analysis is not an easy task, those HEIs whose educational programs have small samples, less than 100 records, seem to have little chance of manifesting the existence of reflective students in their ranks, and therefore the search possibilities are significantly reduced, so that the work team has made the decision to carry out the study of identification of reflective students only in educational programs whose sample exceeds one hundred (100) records, such as the following cases: LA, LC, LSC, ISC, LGT and II, leaving out of the analysis the PEs with less than 100 records, such as: IC, IEM, IM, IGE and IL. The educational programs that meet this condition are then analyzed.

3.1) Bachelor of Administration (BA), whose sample amounts to 471 students, with the following results.

For question 1, we found 125 reflective answers (26%); for question 2, we found 47 (38%); for question 3, we found 17 (36%); for question 4, we found 5

(29%); for question 5, we found 2 (40%); for question 6, there were 0 reflective answers. The graphical representation of the answer row is as follows.

(Sample) (471)	P1	P2	P3	P4	P5	P6
Answers Reflective	125	47	17	5	2	0

Note: Own elaboration.

Diagram 9. Reflective response row for the PE LA sample

Two students gave reflective answers up to question five, and have the following characteristics: they are female, enrolled in the ninth semester at the FCyA C-I of the UNACH.

3.2) Bachelor of Accounting (LC), whose sample amounts to 403 students, with the following results.

For question 1, there were 87 reflective answers (21%); for question 2, there were 41 (47%); for question 3, there was 1 (29%); for question 4, there were 3 (25%); for question 5, there was 1 (33%); for question 6, there were 0 reflective answers. The graphical representation of the answer row is as follows.

(Sample) (403)	P1	P2	P3	P4	P5	P6
Answers Reflective	87	41	12	3	1	0

Note: Own elaboration.

Diagram 10. Reflective response row for the PE LC sample

One male student gave reflective answers up to question five, and belongs to the ninth semester of the FCyA C-I.

3.3) Bachelor's Degree in Computer Systems (LSC), whose sample amounts to 330 students, with the following results.

For question 1, we found 72 reflective answers (22%); for question 2, we found 30 (42%); for question 3, we found 16 (53%); for question 4, we found 5 (31%); for question 5, we found 2 (40%); for question 6, we found 1 (50%). The graphical representation of the answer row is as follows.

(Sample) (330)	P1	P2	P3	P4	P5	P6
Answers Reflective	72	30	16	5	2	1

Note: Own elaboration.

Diagram 11. Reflective response row for the PE LSC sample

The information highlights that one student answered the six reflective questions; consequently, it is the same student identified in previous male variables of the fourth semester, enrolled in LSC. Two students gave reflective answers to question five, and these are the same as those of the FCyA C-I, one of them from the ninth semester, and the aforementioned student.

3.4) Engineering in Computer Systems (ISC), whose sample amounts to 291 students, with the following results.

For question 1, we found 84 reflective answers (29%); for question 2, we found 38 (45%); for question 3, we found 18 (47%); for question 4, we found 3 (17%); for question 5, we found 1 (33%); for question 6, there were 0 reflective answers. The graphical representation of the answer row is as follows.

(Sample) (291)	P1	P2	P3	P4	P5	P6
Answers Reflective	84	38	18	3	1	0

Note: Own elaboration.

Diagram 12. Reflective response row for the PE ISC sample

One student gave the reflective answers up to question five, and it is the same male student enrolled in the fifth semester at the UTCJ.

3.5) Bachelor's Degree in Tourism Management (LGT), whose sample amounts to 243 students, with the following results.

For question 1, we found 68 reflective answers (28%); for question 2, we found 25 (37%); for question 3, we found 28 (20%); for question 4, we found 2 (40%); for question 5, we found 2 (50%); for question 6, there were 0 reflective answers. The graphical representation of the answer row is as follows.

(Sample) (243)	P1	P2	P3	P4	P5	P6
Answers Reflective	68	25	5	2	1	0

Note: Own elaboration.

Diagram 13. Reflective response row for the PE LGT sample

One male student gave reflective answers up to question five, enrolled in the ninth semester of the UNACH's FCyA C-I.

3.6) Industrial Engineering (II), whose sample amounts to 168 students, with the following results.

For question 1, we found 45 reflective answers (27%); for question 2, we found 18 (40%); for question 3, we found 6 (33%); for question 4, we found 2 (33%); for questions 5 and 6, there were no reflective answers.

Its graphical representation is as follows.

(Sample) (168)	P1	P2	P3	P4	P5	P6
Answers Reflective	45	18	6	2	0	0

Note: Own elaboration.

Diagram 14. Reflective response row for the PE II sample

Two students (male and female) gave reflective answers up to question four, enrolled in the fifth semester at ITCJ.

4. Analysis by Gender

4.1) Female, whose sample amounts to 962 students, with the following results.

For question 1, we found 213 reflective answers (22%); for question 2, we found 97 (45%); for question 3, we found 22 (23%); for question 4, we found 7 (32%); for question 5, we found 2 (28%); for question 6, there were 0 reflective answers. The graphical representation of the answer row is as follows.

(Sample) (962)	P1	P2	P3	P4	P5	P6
Answers Reflective	213	97	22	7	2	0

Note: Own elaboration.

Diagram 15. Reflective answers row for Females

Two female students gave reflective answers up to question five; they are enrolled in the ninth semester at the LA of UNACH's FCyA C-I.

4.2) Males, whose sample amounts to 1210 students, with the following results.

For question 1, we found 327 reflective answers (27%); for question 2, we found 125 (38%); for question 3, we found 61 (49%); for question 4,

we found 16 (29%); for question 5, we found 5 (26%); for question 6, there was 1 reflective answer (20%). The graphical representation of the answer row is as follows.

(Sample) (1210)	P1	P2	P3	P4	P5	P6
Answers Reflective	327	125	61	16	5	1

Note: Own elaboration.

Diagram 16. Reflective answers row for Male samples

Five male students answered the reflective answers up to question five, including the student who answered up to question six of the questionnaire, and have the following characteristics: one, belongs to the UTCJ, enrolled in the fifth semester at ISC; four belong to the UNACH's FCyA C-I, two enrolled in the LSC, one in the LC, and one in the LGT, three of them in ninth semester and one in fourth; includes the student who answered the six reflective options.

Statistical analysis between the variables gender and the reflective answer to question 1

As far as the components and data of the gender variable allow, the following, a goodness-of-fit test is performed, which is particularly useful when the data use the nominal scale, so it is possible to perform a hypothesis test with data classified in groups, as in our case, that are classified by sex, the purpose of the goodness-of-fit test is to compare a distribution of observed frequencies with a distribution of expected frequencies.

The analysis begins by preparing a table of observed frequencies and expected frequencies, that is, the responses provided by the students for the sex variable, in the first case, and the expected frequencies are calculated by dividing the total of the observed frequencies by two. As indicated in Table 1.

Table 1

Observed and expected frequencies of RRP1 in relation to the gender variable

	Reflective Answers for Question 1	
Gender	Seen Frequencies	Expected Frequencies
	fo	fe
Female	213	270
Male	327	270
Total	540	540

Note: Own elaboration.

Observing the behavior of the frequency distribution, the following question arises: Is it reasonable to conclude that there is no difference in the answers given by gender? If so, one would expect the observed frequencies to be equal or almost equal, in other words, one would expect the same number in the male category to be the same as in the female category in their reflexive answers to question 1; thus, any discrepancy between the observed and expected frequencies is attributed to chance, or a sampling error, so the following question must be asked: Is the difference found in the number of times the reflexive answer is selected due to chance or must one conclude that gender does influence this response?

To answer this question, we proceed to the formulation of the following hypothesis system: null hypothesis (Ho), and research hypothesis (Hi), where:

- **Ho: There is no significant difference between the observed and expected frequencies.**

Versus

- **Hi: There are significant differences between the observed and expected frequencies.**

Using a significance level of 5% means the probability of rejecting the null hypothesis when it is true.

The test statistic to be used is the Chi-square given by:

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e}$$

Where:

fo: observed frequencies, fe: expected frequencies

As indicated in Table 2.

Table 2

Observed and expected frequencies for calculating Chi-square

fo	fe	fo-fe	(fo-fe)^2	(fo-fe)^2/fe
213	270.00	-57.00	3249.00	12.03
327	270.00	57.00	3249.00	12.03
540				
			Chi-cuadrada	**24.07**

Note: Own elaboration.

Using the Chi-square formula and applying the data found above, we have:

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e} = \mathbf{24.07}$$

Therefore, the calculated Chi-square value is **24.07**.

Once the hypothesis system has been established for testing, a significance level of ∝ = 5% and a confidence level of Z= 95% is defined. Subsequently, the degrees of freedom for the Chi-square (gl) is calculated according to the procedure (number of columns-1) (number of rows-1), that is equal to (2-1) (2-1) = 1*1= 1.

With these data we locate the critical value of the Chi-square statistic in Table H, Chi-square distribution, in the book *Applied Statistics for Business and Economics*, Webster, Allen (2000) as follows: considering 1 gl and significance level ∝ = 5% it is found that the critical value expressed as $\propto_c^2$=**3.841**, which when compared with the calculated Chi-square value of 24.07 turns out to be lower, i.e., 3.841 < 24.07, a relationship that suggests taking the following decision:

Rejecting the null hypothesis and accepting the research hypothesis with a confidence level of 95%, i.e., the relationship between the variables gender and reflexive answer in question 1 is significant, in other words, they are dependent variables, it is concluded that the reflexive responses provided by the sample members do have a significant relationship with their gender.

III. RESULTS

This article, as stated at the beginning, is a continuation of the research *Reflective learning among higher education students* in Mexico (2022-2023), the results of which were presented in the final report, in various congresses on the subject, and in the book that is in the process of being edited for publication. The main objective of this research was to determine the degree to which higher education students in Mexico make use of reflective processes during their professional studies, since according to the literature consulted, the reflective moment seems to be a different stage and perhaps superior to the types of learning by reasoning and memorizing, without detracting from their importance in the learning processes in all areas of human knowledge.

A collateral objective was to know how many students among the population of 2172 were able to answer the reflective options of the first six questions of the questionnaire, in the intelligence that, in the Likert scale questions, from seven to 24, approximately 70 percent of them showed an orientation to learning by reasoning and it remained to analyze and identify the entirely reflective students in this sample. The procedure was explained in the section *method* of this work, obtaining the following results.

- Only one person, from among the population of 2172 students, was able to respond to the six reflective responses: a male student from the fourth semester of the LSC, at UNACH's FCyA C-I. Other six students managed to answer up to question five the reflective options: the first student is male and belongs to the UTCJ, enrolled in the PE of ISC in fifth semester; six belong to UNACH's FCyA C-I, two are enrolled in the LA, two in the LSC, one in the LC and one in the LGT; five of them are in ninth semester and one in fourth; four are male and two are female.

- In UNACH's School of Accounting and Administration C-I, with a sample of 1196 students, six students gave reflexive answers up to question five, plus the student who answered up to question six, whose characteristics coincide with the information of the students of FCyA C-I that appear in the previous analysis; therefore, their characterization is obviated.

- At the Instituto Tecnológico de Ciudad Juárez, with a sample of 537 students, six of them gave reflexive answers up to question four; they are enrolled in different educational programs between the fifth and tenth semesters; two are female and four are male.

- At the Instituto Tecnológico de Tuxtla Gutiérrez, with a sample of 121 students, three of them gave reflexive answers up to question three; there are no reflexive responses for questions four, five, and six.

- At the Universidad Autónoma del Estado de México, with a sample of 119 students, one male student gave reflexive answers up to question four; he's enrolled in the tenth semester of ISC.

- At the Universidad Tecnológico de Ciudad Juárez, with a sample of 113 students, one male student gave reflexive answers up to question five; he's enrolled in the fifth semester of ISC.

- In the Faculty of Engineering of the UNACH, with a sample of 81 students, one male student gave reflexive answers up to question four; he's enrolled in the first semester of IC.
- In the Bachelor's Degree in Administration, with a sample of 471 students, two female students gave reflexive answers up to question five; they're enrolled in the ninth semester at UNACH's FCyA C-I.

- In the Bachelor's Degree in Accounting, with a sample of 403 students, one male student gave reflective answers up to question five; he's enrolled in the ninth semester at the FCyA C-I.

- In the Bachelor's Degree in Computer Systems, with a sample of 330 students, one of them answered the six reflective questions; consequently, it is the same student identified in previous variables, he's male and enrolled in the fourth semester. Another male student answered reflectively up to question five; he was already identified in the ninth semester at the FCyA C-I.

- In Computer Systems Engineering, with a sample of 291 students, one male student gave reflective answers up to question five; he's the same one enrolled in the fifth semester at the UTCJ.

- In the Bachelor's Degree in Tourism Management, with a sample of 243 students, one male student gave reflective answers up to question five; he's enrolled in the ninth semester at UNACH's FCyA C-I.

- In Industrial Engineering, with a sample of 168 students, two of them (one male and one female) managed to give reflective answers up to question four, both enrolled in the fifth semester at the ITCJ.

- In relation to the female gender, with a sample of 962 students, two of them gave reflective answers up to question five, both enrolled in the ninth semester of the Bachelor's Degree in Administration at UNACH's FCyA C-I.

- Regarding the male gender, with a sample of 1210 students, five of them gave reflective answers up to question five, including the student who answered up to question six: one, belongs to the UTCJ, enrolled in the fifth semester at ISC; four belong to UNACH's FCyA C-I, two enrolled in the LSC, one in the LC, and one in the LGT, three of them in ninth semester and one in fourth; including the student who answered the six reflective options.

Regarding the statistical analysis between the observed frequencies and the expected frequencies with the reflective responses of question 1 in relation to the gender variable, it is observed that the research hypothesis is accepted with a confidence level of 95%, that is, the relationship between the gender and reflective answer variables of question 1 is significant, in other words,

they are dependent variables, it is concluded that the reflective responses provided by the members of the sample if they have a significant relationship with their gender.

IV. DISCUSSION

Learning techniques have evolved over the course of time, from the ancient Greeks who recognized themselves as great teachers of pedagogy and didactics - the Socratic method is an authentic process of reflection -, including the contributions of education in China, in India, in Egypt, in the Hebrew region; the Greek, Roman, medieval, positivist, and socialist pedagogical thought from the new school, critical pedagogical thinking; the development of learning theories: traditional, cognitive, modern theories; and today education mediated by information and communication technologies (ICTs) that represent a real revolution in the educational field with computers, mobile computers, the Internet, the Web, educational platforms, etc.

It can also be said that scientific and technological progress since it began almost 400 years ago, when René Descartes published his founding work *The Discourse of the Method* (1637), the process of accumulation of systematized and reliable knowledge and knowledge is detonated in all areas of knowledge, mainly in the natural sciences, through a unique privilege function of human beings: the intellect, which, according to our precursor studies, seems to occur in three moments of human cognition: memory, reasoning, and reflection, the latter being reflection, the true responsible for the development of societies and humanity, considering it the function where new ideas, new knowledge, innovations, creations, inventions, discoveries originate, which have allowed the current scientific and technological stage to be reached, without in most cases, researchers being aware of their reflective capacity and their reflective methodology (Alvesson & Skoldberg; 2000) applied in their creative processes.

The results obtained in this study indicate that only one student from the population of 2172 was able to answer the response options in the first six questions of the questionnaire applied in the research *Reflective learning in students of higher education in Mexico*. In that same sample, six more answered up to question five; when the data are analyzed by variables, that is, by HEIs, educational programs, and gender, the chances of finding reflective students visibly decrease, in many cases reaching only question four.

The above may be indicating the difficulties involved in reflective abilities in students of higher education in Mexico, with the characterizations of the variables included in the original study, such as HEIs, educational programs, gender, age (in a range of 18 to 26 years) and semester (from the first to the tenth, in some cases), in such a way that it is suggested the real identification

of students recognized as reflective in a general way and follow up on their study habits to learn more about them to be able to model, as far as possible, these outstanding students.

During the documentary research in relation to reflective learning, studies applied only to 15-year-old secondary school students (Laisequilla, 2018) were found, to analyze the results of the PISA test. Crespo-Cabuto, et. al. (2019) explored the psychometric properties of an instrument to measure reflective thinking skills in university students, in the State of Sonora, Mexico.

For his part, González-Moreno (2012) studies the formation of reflective thinking in students at a Catholic university in Bogotá, Colombia, taking as a sample only 25 women with an average age of 19 years in a Bachelor's Degree in Pedagogy, in a qualitative research. Gravini and Iriarte (2008) studied the metacognitive processes of students with different learning styles with a sample of four students from the eighth semester of the Bachelor's Degree in Psychology at the Universidad del Norte in Barranquilla, Colombia.

According to Piaget (1991), children begin their reflective behavior between the ages of seven and eight, when they begin to think before acting, resulting in a clear decrease in their impulsive behavior of early childhood (p. 57). According to Ruffinelli (2017), reflection represents a transversal axis in the training of teachers and one of the basic pillars of the teacher's profile as a reflective professional, prepared for this practice as a source of lifelong learning (p. 3).

The research *Reflective learning among higher education students in Mexico* was carried out with a population of 2172 (44% female and 56% male), with age ranges between 18 and 26 years, from the first to the tenth semester (in some cases), distributed in six HEIs and eleven educational programs.

V. CONCLUSIONS

Considering that the research instrument was the survey prepared since the doctoral thesis on organizational learning in 2003, and replicated with the own adjustments for its application in research on reflective learning in university students in 2023, it presents a high degree of reliability according to the Cronbach's Alpha Coefficient, as well as the reliability analysis prepared for the first six questions of the questionnaire is reliable, plus the consistency shown in the two aforementioned applications, according to Hernández, et. al. (2014) it can be said that the data analyzed and interpreted in this work have sufficient reliability from a scientific perspective.

By virtue of this, and since the research instrument was developed taking into account the theoretical foundations collected during the investigation of the state of the art on the phenomenon of reflective learning, it

can be said that it is not easy for students to respond to all the reflective options from questions one to six, as has been demonstrated in the fact that of the population of 2172 participating students only one was able to answer said block of questions to be considered as a highly reflective student, who is a male student enrolled in fourth semester of the Bachelor of Computer Systems, at UNACH's Faculty of Accounting and Administration C-I, a situation that allows the research team to follow him to observe his study habits and behaviors as a university student, as well as analyze his background in baccalaureate studies.

One should not lose sight of the students who answered up to question five, who have their merit because they have one reflective answer left to be considered highly reflective. They must also be monitored and observed during their school career, because they may favor in the future the approach to a reflective pedagogy in higher education students in Mexico, with the qualities and competitive advantages that in other sections and other studies have been documented.

Although this work aimed to identify reflective students in higher education institutions in Mexico, we are aware that the most important thing is to cultivate a reflective pedagogy aimed at creating reflective thinking habits among our students, which would result in a real competitive advantage as university students today and as successful professionals in the near future.

REFERENCES

Alvesson Mats y Kaj Skoldberg (2000) Reflexive Methodology, New Vistas for Qualitative Research. SAGE Publications, London.

Crespo-Cabuto, A, González-Frías, M. T., Madrid-López, E. J. (2019) Propiedades psicométricas de un instrumento para medir habilidades del pensamiento reflexivo en estudiantado universitario. *Revista Electrónica Educare (Educare Electronic Journal)* EISSN: 1409-4258 Vol. 23(3) SETIEMBRE-DICIEMBRE, 2019:1-13. doi: http://dx.doi.org/10.15359/ree.23-3.16. URL: http://www.una.ac.cr/educare.

González-Moreno, C. X. (2012). Formación del pensamiento reflexivo en estudiantes universitarios. *Magis, Revista Internacional de Investigación en Educación, 4* (9), 595-617.

Gravini Donado, M. L., & Iriarte Diazgranados, F. (2008). Procesos metacognitivos de estudiantes con diferentes estilos de aprendizaje. *Psicología desde el Caribe*, (22), 1-24

Hernández, S., R., Fernández, C., C. y Baptista, L. M. (2014) *Metodología de la investigación*. McGrawHill. https://apiperiodico.jalisco.gob.mx/api/sites/periodicooficial.jalisco.gob.mx/files/metodologia_de_la_investigacion_-_roberto_hernandez_sampieri.pdf.

Laisequilla R. y Margarita E. (2018) Pensamiento reflexivo para el desarrollo y perfeccionamiento de habilidades superiores de pensamiento. *Revista Internacional de Educación y Aprendizaje, 6*(3), ISSN 2255-453X. Global Knowledge Academics. Fundación Universitaria Iberoamericana, Universidad Internacional Iberoamericana. http://journals.epistemopolis.org/index.php/ educación.

Moguel, L., M. (2003) *Aprendizaje organizacional: Naturaleza, evolución y perspectivas. Estudio de caso en cuatro organizaciones en México*. Universidad Autónoma Metropolitana unidad Iztapalapa, Tesis doctoral. https://www.eumed.net/tesis-doctorales/2011/mjml/indice.htm.

Piaget, J. (1991) *Seis estudios de psicología*. Labor. http://dinterrondonia2010.pbworks.com/f/Jean_Piaget_Seis_estudios_de_Psicologia.pdf.

Rojas S., R. (2013) *Guía para realizar investigaciones sociales*. Plaza y Valdez. https://raulrojassoriano.com/cuallitlanezi/wpcontent/themes/raulrojassoriano/assets/libros/Antologia-Libros-Raul-Rojas-Soriano.pdf.

Ruffinelli, A. (2017) Formación de docentes reflexivos: un enfoque en construcción y disputa. *Educ. Pesqui., São Paulo*, v. 43, n. 1, p. 97-111, jan./mar. 2017. http://dx.doi.org/10.1590/S1517-9702201701158626. Universidad Alberto Hurtado, Santiago, Chile.

Webster, A. (2000) *Estadística aplicada a los negocios y la economía*. McGraw Hill. Https://dennismontes2.files.wordpress.com/2014/11/estadistica_negocios.pdf.