

VALIDATION OF AN EVALUATION INSTRUMENT FOR THE ETHICS WORKSHOP COURSE AT TECNOLÓGICO NACIONAL DE MÉXICO

VALIDATION OF THE EVALUATION INSTRUMENT FOR THE SUBJECT WORKSHOP OF ETHICS OF THE NATIONAL TECHNOLOGIST OF MEXICO

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Abstract - As part of the subsequent studies proposed in previous research projects, the intention of this article is to present the results obtained from the validation process of an instrument to evaluate the performance of students in the Ethics Workshop course, taught at the Tecnológico Nacional de México (TecNM), in order to gather information about the results that are being obtained with the inclusion of a course on ethics in all undergraduate programs of study at the TecNM.

For this purpose, two validation methodologies were implemented: one evaluation following the Delphi method, and the other by calculating the reliability index with the KR-20 formula from a sample obtained consecutively from students belonging to four different groups in which the Ethics Workshop subject was taught during the period August-December 2020.

The results obtained with the Delphi methodology were an average score above 3.75 points in each item, based on a Likert scale from 1 to 5, to evaluate the relevance of each item, with respect to the specific competence it seeks to evaluate; in addition, the result of the test application of the instrument, in a sample of students, was a reliability coefficient of 0.69 with the KR-20 formula, which indicates an acceptable reliability of the instrument.

From the aforementioned results, it is concluded that the instrument designed has been duly validated and is reliable, so that can continue with its application on a larger scale, to begin with the collection of information that will allow us to have an objective panorama, with respect to the results that are being obtained with the teaching of the subject Ethics Workshops in all the programs of the TecNM.

Keywords: ethics education, engineering ethics, ethics assessment.

Abstract -- As part of the subsequent studies that were proposed in previous research projects, the intention of this article is to present the results obtained from the validation process of an instrument to evaluate the performance of students on the Ethics Workshop subject, which is taught at the Tecnológico Nacional de México (TecNM), in order to be able to gather information about the results that are being obtained with the inclusion of a subject on ethics, in all of the TecNM's undergraduate study programs.

For this, two validation methodologies were implemented: an evaluation following the Delphi method, and the other by calculating the reliability index with the KR-20 formula from a sample obtained consecutively, of students belonging to four different groups in which the Ethics Workshop was taught during the August-December 2020 period.

The results obtained with the Delphi methodology was an average score higher than 3.75 points in

each item, based on a Likert scale from 1 to 5, to evaluate the relevance of each item, with respect to the specific competence that it seeks to evaluate; Furthermore, the result of the test application of the instrument, in a sample of students, was a reliability coefficient of 0.69 with the formula KR- 20, which indicates an acceptable reliability of the instrument.

From the aforementioned results, it can be concluded that the designed instrument has been duly validated and is reliable, so it can continue with its application on a larger scale, to begin collecting information that allows to have an objective panorama, regarding the results that are being obtained with the teaching of the Ethics Workshops subject in all of the TecNM programs.

Key words - Teaching of ethics, engineering ethics, ethics evaluation.

INTRODUCTION

In accordance with the general trend among universities worldwide to include the teaching of ethics to their students, which has been observed since the beginning of the century [1], the Tecnológico Nacional de México (TecNM) implemented in 2004 a strategy to include the teaching of ethics in the education of all its undergraduate students, which consisted in the inclusion of a compulsory subject on ethics in the curriculum of all its undergraduate programs [2]. This strategy also responds to the urgent need to incorporate the ethical aspect in the training of engineers, in order to enable them to face moral dilemmas in the exercise of their profession, as concluded in several studies.

[3] [4].

This is particularly relevant in the case of TecNM, given its educational vocation, where 86% of its educational offerings consist of engineering programs [5].

In addition, as part of the conclusions of a previous work [6], the need to formalize the design and validation work of the instrument with which to obtain diagnostic information, which will allow reviewing the results being obtained with the strategy for teaching ethics, implemented in the TecNM, was raised.

Problem statement.

Despite having been implemented for more than 16 years, there is not much information about the results achieved with the strategy of including the subject of Ethics in all TecNM undergraduate programs.

Considering that this strategy is not the only one through which universities have incorporated the teaching of ethics [7] [8], it becomes more relevant to evaluate and analyze the results that are being obtained with it.

In order to evaluate the results, it is necessary to have reliable and objective information about the results that are being obtained with this strategy. Therefore, the problem that motivates the present research work is that there is no instrument that allows to generate this information correctly based on what is being achieved with the mentioned strategy.

General Objective

To validate an instrument to evaluate the performance of the students of the Ethics Workshop the undergraduate programs of the Tecnológico Nacional de México, in order to gather information to analyze the results obtained with the ethics teaching strategy that has been implemented.

Specific Objectives

- Analyze the syllabus of the Ethics Workshop course; the profile of The TecNM's current Educational Model, in order to identify the competencies to be achieved by the students in this subject, and the TecNM's current Educational Model.
- To design an instrument based on the previous analysis, to be used as a initial point of the validation process by the experts.
- Carry out the validation process of the instrument, based on the method Delphi, using a Likert scale to rate how appropriate each item is to evaluate
- Carry out the validation process by means of a test application of the instrument to a sample of students

belonging to four different groups, using the KR-20 reliability coefficient of the responses obtained in the aforementioned application.

Theoretical Framework

For the present work, the evaluation instrument to be validated is a questionnaire, understood as a set of questions to collect structured information in a sample of people, about the subject, which in this case is the knowledge acquired in the subject Ethics Workshop, in order to make a statistical treatment that demonstrates some relationship between variables [9].

It should be clarified that for the purposes of this project, some ideas about contemporary didactics are taken up, from which it is stated that no evaluation instrument can determine precisely what a human being knows or does not know [10], but that the intention of evaluation should be to guide the teaching process, as one more moment that shapes the training process, instead of being the mere assignment of a grade, as a subsequent moment to the training process.

Thus, the intention of the research team is not to quantify the knowledge that students have acquired, but to collect data that show the relationship between performance results and the competencies established in the course [11].

With respect to the evaluation of ethics in higher education, it is important to point out that there are few studies on the subject, and of those that do exist, the vast majority belong to the area of knowledge of medicine and health sciences.

[6] 12]. However, based on these studies, some relevant theoretical distinctions were taken up with respect to what a course on ethics contributes to the education of students in higher education.

We start from the distinction between two main lines regarding the teaching of ethics: *moral reasoning*, understood as the intention to promote traditional professional values during the training of professionals, and *ethical sensitivity*, understood as the teaching of tools to identify and respond to ethical problems of professional practice, as proposed by Eckles

et al (2005) cited by Esquerda et al [13]. In addition, the *Defining Issue Test* (DIT) by Rest [14], and the *Problem Identification Test* (PIT) by Hebert [15] are used as reference assessment instruments.

Thus, considering the specific competencies established in the TecNM Ethics Workshop Program,

The instrument designed is considered a mixed-type questionnaire because it includes two types of items, which are closed multiple-choice questions and open-ended questions [16]. Although it is known that closed questions offer advantages to evaluate the answers of the questionnaire respondent, given the general and specific competencies defined in the program of the Ethics Workshop course, it is clear that the knowledge to be evaluated refers to reflection and ethical foundations in decision making, so it is essential to ask open questions [17] [18].

With respect to the validation process of this instrument, the Delphi method was chosen to validate the precision with which the items allow the measurement of what the object of study really wants to measure [19]. The reasons why this method was chosen are that it allows a final decision to be reached without forcing false consensus; it allows the anonymity of the experts, which avoids pressure and the effect of authority, and, in addition, it allows controlled feedback from the research team [20]. On the other hand, also as part of the validation of the instrument, Kurder-Richardson formula 20, also known as KR20, was used, which allows the calculation of an internal consistency reliability coefficient, as proposed by Ruiz Bolivar [21].

The main reason for using this method to calculate reliability was its simplicity and the possibility of being able to perform all the operations openly using software, instead of requiring specialized statistical software. For this, it is necessary to carry out an application of the instrument and calculate the coefficient from the responses obtained. Therefore, it was decided to carry out a test application of the instrument designed, in a consecutive sample, that is to say, the first students that

voluntarily asked to answer the questionnaire [22].

With respect to the design of the instrument for evaluating the performance of students in the Ethics Workshop course, an analysis was made following a documentary research methodology [23] to understand in as much detail as possible, the intentionality with which the teaching of ethics was initially implemented. That is why the work of Vargas Cortez [24] was considered, in which he carries out an analysis on the integration of the Ethics Workshop as part of the explicit curriculum of the TecNM undergraduate programs, through a retrospective study of the curricula from 1993 to 2010, entitled *La formación social y ética en ingeniería: Its transition from the hidden curriculum to the explicit curriculum*, which to document the way in which humanistic disciplines were included in the profile of engineers trained at the TecNM, going from the time when this type of knowledge was taught in the hidden curriculum, that is, implicitly within all subjects, through the Academic Reform of Higher Technological Education in 1993, in which some common subjects were included, in response to the need to work on soft skills now in the explicit curriculum; and the change to the *Educational Model for the 21st Century* in 2004, where the number of common subjects was increased and the subject *Ethics Seminar* was included, until reaching the *Educational Model for the 21st Century: Formation and Development of Professional Competencies*, in which the entire curricular model was oriented towards professional competencies, and the *Ethics Seminar* was transformed into the *Ethics Workshop*, which is currently taught.

There is a very small amount of research on how to evaluate the learning of students in the *Ethics Workshop* and the instruments with which it is evaluated. For the present work we took into consideration the work of Mejía [25], who conducted a study during 2013 with a group of 40 people, students and professors, of distance education programs of different semesters, of the careers Industrial Engineering and Computer Systems Engineering. This study has special relevance, because since they were students of

In the distance mode, practically all of them already have work experience, so their testimony regarding the effectiveness of the *Ethics Workshop* is more relevant. The instrument used for the analysis consisted of two sections, the first included 14 items that questioned the interviewee about whether or not certain problematic situations arose in their work environment. The validation of this part of the questionnaire was evaluated with the paired contrast technique. The second part consisted of ten open-ended questions, six of them to identify the causes of the ethical dilemmas recognized in their work environment, while the remaining four questions were focused on identifying the problems associated with their online training. The answers obtained were critically contrasted with the theories of Communicative Action and the Minimal Ethics of the authors Vygotsky [26] and Cortina [27] to understand the problems of the learning process. Likewise, the questions related to the problem of ethics for engineers in the work environment were contrasted with the studies of the National Society of Professional Engineers, NSPE (2019) [28] and from the Online Ethics Center, OEC for short (2014) [29].

Evaluating the level of learning acquired from a classroom teaching-learning process is usually complex, especially in the area of ethics, since these subjects have a direct impact on the student's attitude, and therefore require approximations to the application of this knowledge in practice, and what some institutions do in this regard is to exemplify with students the decision making process in the face of ethical dilemmas related to the exercise of their profession. In this regard, the work of Guitart [30], who presents a study that sought to test the effectiveness of an ethics workshop, mandatory for psychology students, who, after being exposed to the code of ethics of their profession, were presented with ethical dilemmas and encouraged to evaluate optimal solutions, was taken into consideration. For this purpose, a questionnaire was designed that considered five situations based on the code of ethics, which was applied to 51 fifth grade students of the Bachelor's Degree in Psychology before taking the ethics workshop (pretest); and once the 11 sessions of the course had elapsed, the test was applied again to the same 51 students (posttest). This was done in order to identify the degree which the amount of

The number of correct answers increased once the contents of the program were completed.

Justification

Since there is not much information about results achieved with the strategy implemented since 2004 by the then General Directorate of Higher Technological Education, to include in all its undergraduate programs, a subject called Ethics Seminar, which in 2010 was transformed to the current Ethics Workshop [2], it is of great relevance to have reliable and objective information on the results that are being obtained with this strategy, so it is necessary to initiate a research whose final product is an instrument that allows to generate this well-founded information, regarding what is being achieved with the aforementioned strategy. In addition to this, it is worth mentioning that the strategy of teaching a subject on ethics, whether mandatory or not, is not the only strategy that universities around the world have implemented to address the need to include ethics in the professional training of their students [7], which is another reason why it is relevant to know the results that are being obtained with the aforementioned strategy.

Likewise, in the context of the process of creation and design of the New Educational Model of the Tecnológico Nacional de México, of which there was a process of socialization with the technological community in 2019, it becomes extremely relevant to have information based on the level of performance of students in the Ethics Workshop, since one of the four Principles on which the Model is based is the Philosophical Principle that conceives the student as a citizen of the world [31], which means that students must be able guide their behavior with an ethical sense, both in the professional and social context; Achieving this ability and complying with this principle of the New Educational Model is the work of the Ethics Workshop. Therefore, it is pertinent to know if and to what extent this is being achieved. On the other hand, in the graduate profiles of all the degree programs offered at the Tecnológico Nacional de México, the idea that the graduate will

will be able to practice their profession and behave ethically [5]; therefore, it is pertinent to evaluate the level of performance achieved in the competencies of the subject Ethics Workshop, and in its specific competency that literally refers to the ability to guide the student's actions in the professional and social contexts with ethical sense. Thus, by evaluating the performance achieved in this subject, pertinent and relevant information will be obtained with respect to the fulfillment of the graduate profiles, which, in addition to being important in , is useful in order to comply with other institutional evaluation criteria, such as the accreditation of degree programs, for example.

For all of the above reasons, this research is necessary and fully justified.

DEVELOPMENT

A review process was carried out, in which the Ethics Workshop course syllabus, its general competencies and specific competencies [11]; the graduate profiles of the TecNM undergraduate programs [5]; a book on this course prepared by TecNM teachers [32]; the current Educational Model [31] and the proposal of the New TecNM Educational Model [33]; as well as articles related to the subject were analyzed.

Based on this analysis, a set of questions was developed, organized by each of the four subject topics and their respective specific competencies, which are defined as follows:

- Theme 1: Reflect on the meaning of Ethics and its implications in behavior to guide their practice in various fields and contexts.
- Theme 2: Relates ethics to the development of science and technology to determine its social implications.
- Theme 3: Acquires the commitment to propose solutions to problems through the application of professional ethics, to contribute to the improvement of the areas of human performance.
- Topic 4: Found the ethical practice of professional practice in decision making for the solution of problems in institutions and organizations.

Subsequently, the instrument was designed on the basis of this analysis, and closed multiple-choice and open-ended questions were included, for the reasons already mentioned. In its initial version, the instrument consisted of 19 items in total, of which 11 are multiple choice, and the remaining 8 items combine a dichotomous closed-ended question and an open-ended question, in which they are asked to explain the reason for their answer to the dichotomous closed-ended question, ordered by specific competence and type of question as shown in Table 1:

Table 1. Types of items by specific competency to be evaluated in version 1.

Specific competence	Ask from multiple choice	Open question	Total
1	9	0	9
2	0	4	4
3	0	3	3
4	2	1	3
Total	11	8	19

Source: own elaboration.

As can be seen, the number of questions referring to the specific competency of Topic 1 is much higher than those referring to the other 3 specific competencies. This is due to the fact that the fundamental theoretical concepts on the field of ethics are addressed in Topic 1, to later work on reflections regarding the ethical implications in the field of science and technology, in the field of professional practice and in the field of institutions and organizations, which correspond to Topic 2, Topic 3 and Topic 4 respectively. It can be said that this thematic structure divides the ethics course into two moments: a first moment about ethical theory, and a second moment about the reflection of ethics in the field of engineering. This structure essentially follows the same structure as the courses for teaching ethics in engineering programs at the Polytechnic University of Valencia [3] and Harvard University [34].

Subsequently, once the evaluation had been designed, the panel of experts was formed, for which purpose they were sent an

invitation to collaborate in the project, through the designation of "expert teachers in the teaching of the subject Ethics Workshop ACA-0907" for the evaluation of the designed instrument, to the directors of 22 TecNM institutes, randomly selected within each of the 8 regional zones that TecNM has established to organize all its campuses. In total, a favorable response was received from 9 of the 22 institutes contacted, and a total of 29 expert teachers were initially designated. The initial intention was to conduct a validation process as broad as possible, corresponding to the fact that Ethics Workshop course is taught in all the undergraduate programs of the 365 TecNM campuses, located in all the 32 states that make up the Mexican national territory.

Next, the first round of evaluation according to the Delphi method was initiated, in which the 29 expert evaluators were sent via e-mail the link to Google form, in which, clarifying the specific competency of the subject that each item of the instrument seeks to evaluate, they were asked to rate, on a Likert scale from 1 to 5, how adequate each item seems to them to evaluate the respective specific competency; they were also asked to write their observations and comments.

From this first round of evaluation, responses were received from 19 of the 29 designated evaluators, and based on the evaluations received, the research team analyzed the ratings given, as well as the comments made by the experts. The corrections considered pertinent were carried out in order to create a second version of the instrument designed, which consists of 24 items, of which 11 are multiple choice and 13 combine a dichotomous closed question and an open question, which were ordered by specific competency as shown in Table 2:

Types of items by specific competency to be evaluated in version 2.

Competition specific	Ask from	Ask open	Total
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option multiple			
1	9	0	9
2	0	4	4
3	0	5	5
4	2	4	6
Total	11	13	24

Source: own elaboration.

As can be seen, in response to the feedback received, it was decided to increase the number of questions used to evaluate the second stage of the course, specifically in topics 3 and 4, in which it was decided to reflect on the ethical implications in the exercise of the profession and in the conduct of institutions and organizations.

Afterwards, a link to a Google form was sent again, only to the 19 experts who responded to the first round of evaluation, so that they could carry out the second round of evaluation of the instrument in its second version, under the same mechanics. Once the experts' evaluations were received, which for this second round totaled 15 evaluations, the research team carried out the corresponding analysis.

However, despite an arduous search, the research team did not find theoretical support to consider as "experts" the designated teachers who do not have a training profile related to the field of knowledge of ethics, despite the number of years of experience they have teaching the subject.

Thus, in strict adherence to the Delphi methodology, for which there must be some training criteria under which the evaluators can be experts in the field, only 4 of the 15 teachers who carried out both rounds of evaluation had to be selected, based on a review of the profiles of each one of them. For this selection, profiles related to the teaching of ethics were considered to include a Bachelor's Degree in Philosophy, a Bachelor's Degree in Law and a Bachelor's Degree in Psychology.

Given the general labor circumstances prevailing in the Institutes that make up the TecNM, in which the vast majority of teachers have

profiles related to the educational offer, which is made up of 83% of engineering programs and 17% of programs related to economic-administrative sciences [35]; it is very difficult to find teachers with a profile related to the teaching ethics within the institutes of the TecNM. For this reason, all the aforementioned profiles were considered as related, sufficiently and independently to the area of knowledge of their respective graduate studies, which include Educational Sciences, Quality Management, and Strategic Planning and Technology Management.

Once the final panel of expert evaluators was established, the research team made an analysis based on the ratings and comments received in the second round by this group of four expert teachers, and it was determined that the instrument had been validated in accordance with the Delphi methodology, since an average score of 3.75 or higher was obtained for each of the 24 items. The validated instrument is attached.

Finally, having the instrument validated by the panel of experts, it was decided to carry out a test application of the instrument on students of the Ethics Workshop course. For this purpose, the 4 groups to which the members of the research team taught the subject Ethics Workshop in the period August-December 2020 at the TecNM Tláhuac Campus were taken into consideration. To avoid bias in the answers caused by students sharing the answers, the application was carried out as voluntary and without value for the grade in the subject. Thus, a consecutive sample was formed, that is, starting with the first students who requested to participate, until we had at least 30% of the students in each of the four groups. Table 3 shows the details of the composition of the samples by group:

Table 3. Student samples by group.

Name from group	Total, m students	Sample of Students	of the sample
1M1	27	8	30%
1S1	28	9	32%
1U1	30	9	30%

103	25	9	36%
Total	110	35	32%

Source: own elaboration.

Once the samples per group were formed, the validated evaluation instrument was applied to them by means of an online Google form. Based on the responses obtained in this application, a reliability coefficient of .69 was obtained using the RK-20 formula, which determined that the instrument is highly reliable. The calculation of this formula was carried out as follows:

KR-20 coefficient formula:

$$r = \left(\frac{k}{k-1} \right) \left(1 - \frac{\sum pq}{\sigma^2} \right)$$

where:

k = número total de ítems = 24
 p = deaplicantes que aciertan un ítem
 q = deaplicantes que fallan un ítem
 σ = varianza total de examen

DISCUSSION AND ANALYSIS OF RESULTS

From the validation process using the Delphi method, as part of the feedback received from the expert evaluators during the process, some of the most significant comments were regarding the context of the situations posed in the questions of the instrument. For example, items 5 and 6, originally posed as a problematic situation, a couple of variants of the classic *streetcar dilemma*.

In this regard, several evaluators agreed that it would be better to pose dilemmas with contexts of more real situations. This was definitely addressed in the corrections made for the second version of the instrument, in which both items now pose situations in real contexts.

On the other hand, one of the main problems that both the evaluators and the research team encountered was with respect to the open-ended questions. The dilemmas posed both in the context of scientific and technological development, corresponding to theme 2, and in the context of professional ethics, corresponding to theme 3, are contemporary situations whose pertinence

was even deserving of congratulatory comments among the expert evaluators, however, it was not overlooked the fact that the task of grading answers to open-ended questions is complex and requires a very clearly established criterion for the sake of objectivity in grading, as much as possible.

, an average score of 3.75 or higher was obtained for each of the 24 items of the second version of the instrument designed. This rating was expressed on a Likert scale from 1 to 5, where 5 is the highest rating, with respect to the relevance of each item for evaluating the specific competency it is intended to assess.

The results of the final scores for each item in the second version of the instrument were as follows

as shown in Table 5:

Table 5. Results of the second round of expert evaluation.

Item no.	Evaluator 1	Evaluator 2	Evaluator 3	Evaluator 4	Average rating
1	5	4	4	4	4.
2	5	4	5	4	4.
3	5	3	5	4	4.
4	5	3	5	5	4.
5	5	4	5	4	4.
6	5	4	5	4	4.
7	5	4	5	3	4.25
8	5	4	5	5	4.
9	5	4	4	5	4.
	4	4	4	4	4.
	4	4	5	4	4.
	4	4	3	4	3.
	5	4	5	5	4.
	5	4	5	4	4.
	5	4	5	4	4.
	5	4	5	4	4.
	5	4	5	4	4.
	5	4	5	5	4.
	5	4	3	4	4.
	5	4	5	3	4.
	5	4	5	3	4.

					<u>4</u>
24	5	4	5	3	4.25

Source: own elaboration.

As can be seen in the table, in fact, practically all the items except one, number 12, have an average score equal to or higher than 4, which is a fairly favorable result in general terms.

Likewise, with respect to the reliability of the instrument, the total number of responses was counted.

correct scores obtained for each item, as well as the respective of correct percentages

The results are shown in Table 4, which corresponds to the elements "p" and "q" in the KR-20 formula:

Total hits and misses per item.

No. Item	Correct answers	p	q	p x q
1	24	0.69	0.31	0.22
2	32	0.91	0.09	0.08
3	30	0.86	0.14	0.12
4	29	0.83	0.17	0.14
5	30	0.86	0.14	0.12
6	27	0.77	0.23	0.18
7	21	0.60	0.40	0.24
8	24	0.69	0.31	0.22
9	31	0.89	0.11	0.10
10	21	0.60	0.40	0.24
11	24	0.69	0.31	0.22
12	19	0.54	0.46	0.25
13	27	0.77	0.23	0.18
14	35	1.00	0.00	0.00
15	27	0.77	0.23	0.18
16	29	0.83	0.17	0.14
17	35	1.00	0.00	0.00
18	16	0.46	0.54	0.25
19	32	0.91	0.09	0.08

20	19	0.54	0.46	0.25
21	33	0.94	0.06	0.05
22	32	0.91	0.09	0.08
23	31	0.89	0.11	0.10
24	35	1.00	0.00	0.00

Source: own elaboration.

Then the calculation of the first element of the formula is as follows:

$$\left(\frac{k}{k-1}\right) = \left(\frac{24}{24-1}\right) = -1.04347826086957$$

For the second item, the total variance of the test was calculated from the total hits per student, with the following result:

$$\sigma^2 = 2.06$$

Thus, the calculation of the second element is as follows:

$$\left(-\frac{\sum pq}{\sigma^2}\right) = \left(1 - \frac{3.42040816326531}{2.05546218487395}\right) = -0.664057937156874$$

Having the values of both elements of the formula, the value of the coefficient was calculated with the following result:

$$r = (-1.04347826086957)(-0.664057937156874) \\ r = 0.692930021381085 = 0.69$$

Reliability coefficient KR-20 = 0.69

According to Ruiz Bolivar [21], this corresponds to a high reliability value.

CONCLUSIONS

Given the results obtained in the validation process by means of the panel of experts, it can be concluded that the objective of the research was achieved, and that each item of the instrument designed has received a high rating with respect to its relevance for evaluating the specific competency it seeks to assess.

In addition, given the results obtained from the application of the test to the sample of students, it can be concluded that the objective was achieved, in that the reliability coefficient

obtained is within the high reliability range. Consistent with the intention that justifies the validation of this instrument, the immediate subsequent work should consist of the systematic and measurable application of the instrument in the largest possible number of students belonging to any educational program of the TecNM, and who have taken the Ethics Workshop course. This in order to begin to gather information about the performance achieved by students in different programs and campuses.

Finally, it is important not to lose sight of the fact that the more information we have about student performance in this subject, the more feasible it becomes to study the contents, methods and teaching techniques implemented by the teachers of this subject. As has already been shown in previous studies, a critical situation within the TecNM is the high percentage of teachers who teaching this subject without having either a related profile or any training in this regard. Therefore, objective information is required, collected by means of the same validated instrument, which can support the impact of this practice, as well as any other variable that the results suggest to analyze.

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