METHODOLOGY TO OBTAIN THE IMPACT OF TEACHER TRAINING COURSES AT TECNM/IT PACHUCA

Salvador Martínez Pagola
TecNM/IT Pachuca, Department of Systems and Computing
Pachuca, Hidalgo, Mexico
https://orcid.org/0000-0003-4937-0996

Eric León Olivares
TecNM/IT Pachuca, Department of Systems and Computing
Pachuca, Hidalgo, Mexico
https://orcid.org/my-orcid?orcid=0000-0002-6342-3719

Angélica Enciso González
TecNM/IT Pachuca, Department of Systems and Computing
Pachuca, Hidalgo, Mexico
https://orcid.org/my-orcid?orcid= 0000-0001-6337-6847

Luis Mendoza Austria
TecNM/IT Pachuca, Department of Systems and Computing
Pachuca, Hidalgo, México

Abstract: The impact of teacher training in higher education institutions is essential to know the way in which the competences acquired by teachers in their training are being exercised and take them to the classroom to verify that what has been learned is part of the didactic planning and teaching-learning strategies. In In this sense, it is necessary to know the impact through an effective method, which consists of taking advantage of the teachers of the courses that is, their qualifications obtained, the qualification of the service offered, generation of groups of control through opinion surveys of students and teacher and departmental evaluations, with this it is sought create dynamic tables with different variables that allow to verify the impact with averages according to the variables used and described in the process of this investigation.

Keywords: Training Impact, Teacher training, evaluation, competencies, control groups.

INTRODUCTION

The competitiveness of organizations demands the design of innovative and dynamic strategies that respond to the needs of their users. In the educational fieldof a higher type, the teaching update guarantees to a large extent the quality of the service provided, for this reason training is essential and requires a correctly designed process from planning based on educational trends and needs and later the evaluation of the impact as part of the continuous improvement process.

This article shows a theoretical framework in which the impact of training is documented through different methodologies studied and applied by a diversity of institutions in different economic sectors, including education.

Subsequently, the description of the Method is presented, where the problem identified in the evaluation of the impact on teacher training is mentioned, the objective that is sought to be met and the selected methodology that shows the step-by-step procedure from the recovery of the data by item to the Analysis of information

Finally, the conclusions and recommendations of general application for the TecNM/ITPachuca are presented, which can be extended to similar educational institutions.

THEORETICAL FRAMEWORK

There are different evaluation models that are effective for any type of company and/or institution to be able to measure the impact of personnel training. In this article, the use of the Kirkpatrick method is proposed, since due to the points that constitute it, it is adaptable to the objective sought. The Kirkpatrick model has several levels of impact description, these are: response, learning, performance and results.

However, there are also other models, such as Ralph Tyler's evaluation model, which consists of a list of expected results and results obtained and its purpose lies in the analysis, the comparison between objectives and achievements, it is an easy method to analyze, understand and apply, emphasizes the importance of a continuous cycle of evaluation, analysis and behavior, but its problem is that it is goal-oriented, it tends to turn evaluation into a terminal event, allowing only judgments about the final product; by applying it this way, the opportunity to use the data collected to refine the program during the course is lost.

According to Orozco (2017), in Mexico, the term labor competencies began to be applied in the mid-90's. Promoted by the Federal Government, through the CONOCER - Council for Standardization and Certification of Labor Competence, the body in charge of establishing a certification system for the labor capacity or "competence" of workers,

in order to promote their development based on performance quality standards; This competency system must also serve to guide education and training towards the needs of the productive and labor markets (.Matilde, E., Rodríguez, R., Elmina, D., & Rivadeneira Rodríguez, M, 2022).

The evaluation component is made up of some evaluation instruments used in non-formal teaching-learning processes. The evaluation instruments are information recording formats that have their own characteristics. They serve to collect the information that is required based on the characteristics of the learning that is intended to be evaluated and the conditions in which it will be applied. (Añorve, G, et al. 2010, p. 3).

Impact evaluation is a method that combines quantitative and qualitative analysis that makes it possible to determine more broadly if the project has or could have the expected effects on the beneficiaries (individuals, groups of individuals or institutions). Leyva-Reyes, Nayvis, & Hidalgo-Parra, Yohana, & Hernández-Hechavarría, Yusleidis (2020)

On the other hand, according to Orozco (2017), some models to measure the evaluation of the impact on training are:

According to Werther, et al., (2000), it indicates that the evaluation stages of a training process must follow the following steps:

1. Evaluation standards
2. Exam prior to the course or programs
3. Employees Cited
4. post course exam
5. transfer to position
6. Follow-up

According to Orozco (2017), internationally the most recognized method for measuring the impact of training is that of Donald Kirkpatrick, Professor at the University of Wisconsin. Donald Kirkpatrick's Learning Evaluation Model 1959; review and contextual material Alan Chapman 1995-2013.]. Since its emergence in 1959, this training action evaluation model is known as the pioneer and has been the most widely used due to its simple, flexible and complete characteristics. It consists of four levels:

1. assess reaction
2. assess learning
3. assess behavior
4. Evaluate the results

Similarly, Orozco (2017) indicates that another very efficient model is known as CIPP, for its acronym in English context, input, process and product, proposed by Stufflebeam and Shinkfield and whose implementation stages are:

1. Context
2. Supplies
3. processes
4. Product

The following model also mentioned by Orozco (2017) is called CIRO by its acronym in English and corresponds to Context, Inputs, Reaction, Outputs, created by Peter War, Michael Bird and Neil Rackham in 1970, who consider evaluation as a continuous process, which begins with the identification of needs and ends with the training process and includes the following stages:

1. Context
2. Tickets
3. reactions
4. Departures

The GDOR model, according to Reyes (2010) is related to the management of organizational development created by Heures Network, it consists of three steps:

1. Determine management indicators

2. Design a custom development model,

3. View training programs and their impact in terms of ROI (Return on Investment).

Leyva-Reyes, Nayvis, & Hidalgo-Parra, Yohana, & Hernández-Hechavarría, Yusleidis (2020), Wade's training / training model, conceives evaluation as measuring the value that training brings to the organization and from that perspective develops an evaluation model structured in four levels:

1. Answer

2. Action

3. Results

4. Impact of training on training

The Phillips model adopts the calculation of return on investment (ROI) to training and uses it as an instrument to measure the results of profitability considering the next phase according to Leyva-Reyes, Nayvis, & Hidalgo-Parra, Yohana, & Hernández-Hechavarría, Yusleidis (2020)

1. Data Collect

2. Isolation of training effects

3. Classification of economic and non-economic benefits

4. Conversion to monetary values.

5. Calculation of return on investment.

The methods presented were considered in order to make a comparison and consider the best option, which is shown in the selection of the methodology in the following section.

METHOD DESCRIPTION
DESCRIPTION OF THE PROBLEM

This research is aimed at solving the problem of the impact of professional teacher and professional training at TecNM / IT Pachuca (Campus Pachuca). The problem is that even when teachers are trained, a methodology has not been implemented that allows real and precise knowledge of how teacher and professional training courses are used by teachers and the acquired skills are put into practice with the students.

GENERAL OBJECTIVE

To measure the impact of professional and teacher training in the refresher courses taken by IT Pachuca professors, in order to know more exactly what their application is in their teaching-learning processes of the acquired competences.

SELECTION OF METHODOLOGY

As observed in the theoretical framework section, some different methodologies were evaluated to be able to recognize the impact of training, not only at the educational level in teachers, but they are deeper methodologies that allow measuring the impact in environments of all types of companies. .

From this comparison, which is presented in Table 1, the comparison of the different methodologies can be seen.

The present investigation is based on the Kikpatric method, since it had two aspects that allow the application of the methodology efficiently and effectively, the first aspect is that it has sufficient elements to know core items for the impact of the training in our institution, and the second aspect is that we have the information of each of the items that the methodology requires, which are the following:

a) Reaction (Service survey answered by teachers). With a Likert scale, it is measured from 1 to 5 aspects of the service rated by teachers in relation to three areas; Instructor, material and course.

b) Knowledge (Teacher achievement, teacher grades or results). Report of grade lists, by course, by intersemester,

Model	study parameters
Werther	• Context • Tickets • reactions • Departures
kirkpatrick's	• assess reaction • assess learning • assess behavior • Evaluate the results
CIPP	• Context • Supplies • processes • Product
CYRUS	• Determine management indicators • Design a custom development model, • View training programs and their impact in terms of ROI (Return on Investment).
GDOR	• Determine management indicators • Design a custom development model, • View training programs and their impact in terms of ROI (Return on Investment).
Wade	• Answer • Action • Results • Impact of training on training
Phillips	• Data Collect • Isolation of training effects • Classification of economic and non-economic benefits • Conversion to monetary values. • Calculation of return on investment.

Table 1. Comparison of methodologies to assess the impact of training.

Figure 1. Original files for Teacher Evaluation

Figure 2. Original files for Departmental Evaluation of the teacher

Figure 3. Data transformation for the reaction item

Figure 4. Data transformation for the knowledge category (Grade lists by course)

TOTAL COURSES JANUARY 2020 - JUNE 2021	57
TOTAL NUMBER OF ASSISTANTS COURSES JANUARY 2020 - JUNE 2021	729
TOTAL TRAINERS	57
AVERAGE NUMBER OF TRAINERS COURSE	80.19861927
AVERAGE TEACHER EVALUATION COURSE	4.760159299

Figure 5. Total of Courses January-June 2021

VERAGE DEPARTMENTAL SELF-EVALUATION JANUARY - JUNE 2021	4.207777778
AVERAGE DEPARTMENTAL TEACHING PERFORMANCE JANUARY - JUNE 2021	3.966666667
AVERAGE DEPARTMENTAL SELF-EVALUATION AUGUST - DECEMBER 2021	4.297037037
DEPARTMENTAL TEACHING PERFORMANCE AUGUST - DECEMBER 2021	4.301851852

Figure 6. Teacher Self-Evaluation Average January – December 2021

the minimum grade is 70/100, NA is Not Accredited.

c) Application of what has been learned (Control groups, with student surveys). Based on two control surveys, where students answer about their perception of the integration of what has been learned in the courses by teachers, it is also a Likert scale from 1 to 5 and has to do with areas of application of what has been learned in: didactic planning, teaching-learning strategies, integration of competencies of what has been learned in the course, formative evaluation of the student with competencies of what has been learned by the teacher.

d) Institutional evaluation (Teacher and departmental). In this case, the Teacher Evaluation is a questionnaire of 48 questions on a Likert scale that have to do with Mastery of the subject, Course planning, Learning environments, Strategies, methods and means, Motivation, Evaluation, Communication, Course management and the Overall satisfaction. Regarding the Departmental Evaluation, the teacher is evaluated with 80% of the weight of the evaluation by the head of the academic department and 20% in self-evaluation on the aspects of competence of the TecNM that are: Teaching, Management, Linking, Tutoring and Research.

In this sense, we are not closed to the fact that in some subsequent analysis we can make use of some other method that for that moment of maturity does not generate other more convenient results. We need a procedure that includes some phases, these phases are described below.

PROCEDURE

The proposed procedure has the following phases:

a) Data recovery by category

b) Clustering of data files

c) File formatting and processing

d) Reports generation

e) Analysis of the information

Each step is described below:

a) Data recovery:

The data is normally found in Excel tables, information has been considered from the June August 2020 semester to the August December 2021 semester, but the collection process depends only on manual processes, in terms of the reaction and knowledge items, that is, service surveys and grade lists, so the files for each semester have to be collected. The point corresponding to control groups, are also surveys carried out in electronic Google Forms, focused on students who study subjects with teachers trained in both areas, in the professional part and in the teaching part. The results of the teacher and the control group are obtained in real time, also generating an Excel table per group per semester. Finally, Regarding the Institutional Evaluation process, both processes have been systematized, the teacher evaluation carried out by the students and the departmental evaluation process, which is a centralized evaluation system of the TecNM. The recovery of the data is from the original source of information, folders, memory storage disks among others, where the data is located. This is presented in figures 1 and 2.

b) data pooling

Because the data is obtained from different sources, formats (pdf, for example), and even times and dates, it is necessary to group for purposes, this becomes a core point for the next step

c) Formatting and data processing

In the processes of Extraction, Transformation and Loading of data (ETL), a methodology used in data mining and analysis of large amounts of information (Big Data), it must begin by transforming the data in such a way that they have a structure similar to that of data. less per item, place or attach fields that help the analysis and find connections with the other items to be able to load the data properly, in such a way that they can be loaded into an application that can exploit the data and generate reports with the Least effort. This process of transformation or formatting and data processing are shown in figures 3 and 4.

d) Reports generation; With the help of Excel Pivot Tables and Power BI (both MS-Microsoft solutions) we seek to obtain reports that allow us to know the parameters of each item, obtaining data relationships that allow us to generate summary tables on different variables such as:

1. General information card by course and institutional: With averages for each of the items, that is, reactions, grades, average control group responses (if they have one) and institutional evaluations. It is important to comment that this is a report by course and the averages are general. That is, of all participating teachers. See Figure 5.

2. Certificate per teacher courses taken: This certificate shows the number of courses taken, the average grade obtained in each course (an NA is averaged as Zero), its average that indicates the satisfaction of each course, the average of its groups of control (if any) and the average of its institutional evaluation.

3. Certificate per teacher per course and institutional: This certificate shows the name of the course taken, the grade obtained (an NA is averaged as Zero), its average that indicates satisfaction with the course, the average of its control group (if it has one) and the average of its institutional evaluation. See Figure 6.

e) Analysis of the information; In this sense, the analysis of the information is obtained from the reports generated and is oriented to know particularly some aspects that will allow better decisions to be made in the diagnosis, programming, management, monitoring and evaluation of the courses taught, considering aspects such as the following:

1. Use of courses by teachers by department and institutionally.

2. Number of courses and qualification of the service by teachers.

3. Relationship between courses taught, skills acquired and putting them into practice in the classroom or virtual strategies

4. List of courses taken by teachers with respect to their teaching and departmental evaluation.

5. Efficiency in the diagnosis of courses carried out by the academic areas.

These are some aspects of analysis, which possibly at the beginning will allow us to mark a more productive path in measuring the impact of teacher and professional training courses.

CONCLUSIONS AND RECOMMENDATIONS

The final conclusions and recommendations

for a constant improvement of the process are presented below:

CONCLUSIONS

It is a fact that the impact of training courses in an educational institution is quite a challenge, since the final idea is that it helps students receive higher quality educational instruction, but this is often not the same. Since within the process there are original failures that have to do with the proper identification of training needs, since they are not aligned with the curricular needs, another situation is that teachers are only trained to fulfill a requirement, so they do not apply what they can acquire in skills and finally, the fact of not having a systematized mechanism that allows measuring the real impact of the courses and their application.

Therefore, having at least one evaluation process already, variables and more defined measurement relationships, it will be possible to generate a path and a procedural culture that allows improving training courses, training needs, but, above all, that it be applied to those who must be benefited, the students.

RECOMMENDATIONS

After having made this first effort, the following recommendations are suggested for improving the training process at TecNM/IT Pachuca, which are:

1. Systematize the process, that is, avoid manual processes as much as possible through a system that allows online control of the training process.

2. Comprehensive and consistent data management.

3. As the process consolidates, search through other already referenced methodologies, measure other elements of impact.

4. Promote the active participation of the heads of academic departments and academies, in such a way that the diagnoses of needs are consistent with the curricular progress of the students and the graduation profile of the careers.

5. Motivate the active participation of teachers and the application of the acquired skills.

The road is still long, since the impediments are not only related to the process, planning or systematization of the methodology, it also has to do with the attitude of the teaching institutional context.

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