

# Technopedagogical mediation strategies in virtual learning environments

## *Estrategias de mediación tecnopedagógicas en los ambientes virtuales de aprendizaje*

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### ABSTRACT

#### Keywords

Educational technology; virtual learning environment; technopedagogical mediation; virtual tutoring platform; ICT

This paper describes the research done about the importance of establishing technopedagogical mediation strategies when a Virtual Learning Environment (VLE) is implemented. The objective of this work is to improve the efficiency of the Virtual Tutoring Platform in the teaching-learning process through the implementation of strategies in the virtual tutoring model of a technological university. The methodological part of the work was developed using a mixed approach; the qualitative part was worked with a focus group and the quantitative part was carried out with cluster sampling. The main contribution of this work is the six categories and strategies proposed, which can be applied to any VLE. The results confirm the importance of guiding the student, establishing communication mechanisms, interaction and application of learning methodologies as well as their relationship with information communication and technologies. The only limitation so far is that a dedicated server and good bandwidth are required to improve the service.

### RESUMEN

#### Palabras clave

Tecnología educativa; ambiente virtual de aprendizaje; mediación tecnopedagógica; plataforma de tutoría virtual; TIC

*Este artículo presenta los resultados de una investigación sobre la importancia de establecer estrategias de mediación tecnopedagógicas cuando se implementa un ambiente virtual de aprendizaje (AVA). El objetivo es mejorar la eficiencia de una plataforma de tutoría virtual en el proceso de enseñanza-aprendizaje mediante estrategias aplicadas al modelo de tutoría virtual de una universidad tecnológica. La metodología se basó en un enfoque mixto: la parte cualitativa se trabajó con un grupo focal y la cuantitativa, con un muestreo por conglomerados. La principal aportación de este trabajo son las seis categorías y estrategias propuestas, que pueden utilizarse en cualquier AVA. Los resultados confirman la importancia de guiar al estudiante, establecer mecanismos de comunicación, interacción y aplicación de las metodologías de aprendizaje, así como su relación con las tecnologías de la información y la comunicación. La única limitante hasta el momento es que se requiere un servidor dedicado y ancho de banda de calidad para mejorar el servicio.*

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## INTRODUCTION

Pedagogic mediation is a term in use for a long time, and it has evolved with pedagogic models. To Sanceverino (2016) this is a practice performed with a purpose, whereas to León (2014), “pedagogic mediation arises from pedagogic currents, such as the Theory of Significant Learning of Ausubel, Bruner and cognitivism, Vygotsky’s social-cultural-historical theory with the proposal of the Zone of Proximal Development (ZPD) and the intervention between the subject and the object presented by Piaget” (p. 138).

By the implementation of information and communication technologies (ICTs) in the educational field, pedagogic mediation has become part of virtual learning environments (VLE). Amante & Gómez (2017) state that “the boom of including [...] ICTs in the curriculum is the result of an effort to foster motivation and innovation, and as a response to globalization” (p. 110). Using ICTs has gradually become more frequent in the teaching process, above all at a higher level, where the benefits of digital technology are correlated and integrated to improve learners’ competencies (Badia et al., 2016).

It is difficult that educational technology used nowadays created knowledge on its own, hence it is necessary that pedagogic implementation be immerse in this field along with ICTs; this synergy is termed techno-pedagogic mediation. It is important to use proper pedagogic mediation strategies for the intervention process to be successful and supports the learner whenever he/she is in contact with VLE.

Regarding tutoring, it is worth mentioning that, at an international level, especially Spanish institutions of renowned prestige, have implemented them in a virtual manner by means of VLE with satisfactory results (Arnaiz, López & Prendez, 2012). In accordance with Sebastiao *et al.* (2018), we have to “focus on interactive and technological teaching, professionalism, tutoring, communication and feedback.”

In Mexico, universities of technology have established an institutional tutoring program as part of the accompaniment model of learners, whose needs along with the context of these educational institutions fostered the design of a virtual tutoring project. This was implemented by VLE with the idea of strengthening professional

instruction, and the purpose is to improve the efficiency of the virtual tutoring platform (VTP) in the teaching-learning process by means of applying strategies to the virtual tutoring model of the technological university. In order to configure the strategies, we have organized a focal group, and to assess the results, we prepared a questionnaire.

## **PEDAGOGICAL AND TECHNO-PEDAGOGICAL MEDIATION**

To León and Zúñiga (2019), “pedagogical mediation, as well as scientific knowledge, are a fundamental element aimed to attain the development of competencies for scientific, critical and reflexive thinking on learners, fit to the scientific needs of the current society” (p. 4). These competencies are relevant to the university learner.

In accordance to Pérez (2009), “mediation is a form of interaction among persons with different experiences regarding their level of knowledge; one is more experienced and another one is less experienced on a specific topic” (p. 24). In this case, we noted that the professor has a higher level of experience, and the learner has a lesser level. In addition, it is critical that teachers have a defined perception on the importance of pedagogical mediation, especially on VLE (Mora & Diaz, 2016).

Although pedagogical mediation is seen as a process that ought to arise the interest of learners to use contents in a proper manner and to foster creativity and experience (León, 2014). Vega & Aramendi (2011) perceive this as a communication tool to enable dialogue and commitment with learners.

At the higher level, mediation is a valuable instrument to strengthen professional values and competencies (Fernández & Villavicencio, 2016). The use of ICTs has contributed to break barriers regarding space-time and has fostered a greater coverage (Maranza, 2016).

Nowadays, as mentioned by Ntho-Ntho & Nieuwenhuis (2016), pedagogical mediation is still in place as a strategy that enables it to be integrated to the new VLEs with no problem, in addition to change the traditional ways of working and to implement dialogical strategies with interactivity (Gutiérrez & Prieto, 2009).

We cannot ignore the fact that mediators are an essential part in this process: “Mediators are also tools or material things; signs, such as language. Thus, learning is the cultural internalization process, and

it gives meaning to each individual to what he/she sees as a function of his/her own possibility of meaning” (Soto, 2017, p. 56), therefore they ought to be taken into account during the process.

From the concept of mediation and ICTs, a recent concept is discussed called techno-pedagogical mediation, upon which close liaison with VLEs becomes manifest between technological resources and education (Lara, De la Fuente & Veytia, 2017). As noted, pedagogical mediation has a relevant function on the design of VLEs; however, by involving ICTs, significant learning experiences ought to be present, and one of these is techno-pedagogical mediation (Esteban-Guitart, 2016).

The surveys of Castellanos, Sánchez & Calderero (2017) describe the need to implement the techno-pedagogical model for higher level learners, aimed to improve their technological competencies. In respect to the context of this project, it is believed that techno-pedagogical mediation is mainly formed by aspects that refer to the physical environment, communication, contents, virtual tutor, interaction and mediation by computer.

## **VIRTUAL TUTORSHIP**

To Gómez (2014), tutorship is a shared function which enables learner’s guidance on the diverse educational sectors, and sees to specific needs, with the purpose of improving academic performance. Weiss (2016) regards tutorship as a practical guidance for the attainment of educational objectives. Implementation thereof cannot be detached from pedagogical mediation, as they improve the academic practice altogether.

García et al. (2012) say that by incorporating ICTs, it has been achieved that learners who cannot attend classroom sessions to tutorships for whatever reason, may take them virtually, and so, that their needs are fulfilled.

In the university area, tutorship is an essential part on the instruction of Mexican learners; specifically, technological universities have been characterized by offering tutorship so that learners be accompanied during their stay in the institutions. On virtual tutorship, applied didactic strategies provide the tutored learner several possibilities: from possibilities focused on assisting learners both individually and in the group (Ramírez-Hernández, Figueroa & Téllez, 2019). The virtual tutorship mode allows institutions to have a greater tutorship coverage and to strengthen

educational programs by means of distance mentoring (Herrera, 2006).

At the technological university, tutorship is a process where all of the learners partake; however, students of ICTs Engineering have the choice to take it virtually on a dedicated platform. For this reason, the use of VLEs must be taken advantage of so that, together with pedagogical mediation, they form part of a strategy (Gómez, 2013).

### **VIRTUAL LEARNING ENVIRONMENTS (VLEs)**

VLEs are essential in the educational field and, above all, when speaking of technology. With the emergence of e-learning or b-learning, it was necessary to implement platforms to adapt to the need and contexts of each institution. There are several definitions on VLEs; below, we mention some which we believe are representative:

To Miranda (2004, quoted in Del Carmen, Miguelena & Diallo, 2016) “VLE is a set of interaction environments which may be synchronous or asynchronous where, in the basis of a curricular program, the teaching-learning process is carried out; through a learning management system, learning is an exclusive and unique human activity, linked to human thinking” (p. 11).

VLEs make use of technology for learning activities and for improving the skills and knowledge of learners from a perfectly planned instructional scheme with clearly defined objectives (Silve et al., 2016). To Hirt et al. (2019), applicability of VLEs is highly relevant.

Urquidi, Calabor & Tamrit (2019) say that VLEs are technological tools with new didactic communication opportunities, which make the educational process flexible and which enable individualization of the educational process, they enable greater commitment from learners and improve results. We must mention, though, that the implementation process of VLEs requires proper planning in accordance to context.

On the other hand, Herrera (2006) explains that VLEs include constituent elements related to interactions and resources, which are materials integrated to VLEs, among which are texts, images, hypertext or multimedia; physical factors, such as lighting, ventilation, furniture set up, sound and equipment; as well as

psychological factors, involving cognitive mediation by interacting with ICTs.

Additionally, it is believed that instructional design is paramount because this covers every aspect of VLE planning and the educational virtualized process. According to Merchán (2018), it is recommended that VLEs be combined with technological, communicative, technological and pedagogical models for better results.

## **METHODOLOGY**

In the research we applied a combined approach by means of which we contrasted data both in the qualitative and in the quantitative section. In the former, we generated strategies and in the latter we designed a measuring instrument for the efficacy of techno-pedagogical mediation strategies used on VLEs.

Techno-pedagogical mediation strategies were created by a focal group comprised of eight participants who collaborated in the project, experts in areas such as tutorship, pedagogy, ICTs, contents and VLEs. Using a qualitative technique was useful to analyze combined opinions, contradictions and other data emerging from the interaction between people.

Regarding the quantitative part, the population we considered were the twelve tutors who had previously partaken in VLEs and who can objectively compare changes done; the foregoing notwithstanding, we decided to use cluster sampling, which, in accordance with Bisquerra (2009), is recommended when there are natural groups from the population, such as is this case, where we only chose seven tutors who became virtual tutors in the May-August 2019 term, a period when changes were implemented. The sample was intentionally selected, as techno-pedagogical mediation improvements of VLEs were also implemented in this term.

### **Development**

As a result of the focal group work, we identified six categories to classify strategies, and we resumed both pedagogical and technological aspects. The categories are: physical environment, communication, contents, virtual tutor role, interaction with learners, and computer-assisted mediation. Once the categories were defined we went on to define strategies for each category (see table 1):

- Regarding category 1, it is difficult to control the physical environment aspect; however, most of the strategies are recommendations that ought to be given to learners (Herrera, 2006).
- In category 2, communication is a basic element for pedagogical mediation, as specified by Vega & Aramendi (2011), because as there was no physical interaction among participants in VLEs, it is important to have effective mechanisms to assist this highly relevant item.
- In category 3, regarding contents, mediation has a substantial role, because, if there is no close relationship between the pedagogic and technological section, VLE materials would not have any meaning to learners (León, 2014).
- In category 4, we had to define specific strategies concerning the role of the virtual tutor, as his/her role as course mediator is key to the good operation thereof: the tutor is both a facilitator and a conciliator between learners, furthermore, his role ought to be developed in a timely manner (Villarruel, 2009, quoted in Leon, 2014).
- In category 5, we emphasized on a good interaction with the learner; the platform and the tutor; this is to be done by taking the learning methodology used to design the course into consideration (Miranda, 2004, quoted in Del Carmen et al., 2016).
- In category 6, we defined computer-assisted mediation strategies, because using ICTs is paramount in the development of VLEs, as they supply the means so that learning takes place in this context.

**Table 1.** Defined categories and strategies

CATEGORY 1. PHYSICAL ENVIRONMENT	CATEGORY 2. COMMUNICATION
<ul style="list-style-type: none"> <li>• Determine recommendations about the space</li> <li>• Establish conditions of temperature</li> <li>• Recommend lightening conditions</li> <li>• Determine the relevance of ventilation</li> <li>• Consider the minimum technological infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>• Implement synched communication with a meeting chat</li> <li>• Establish means of asynchronous communication such as forums</li> <li>• Send messages about news and notices</li> <li>• Socialize the contributions</li> <li>• Include contact with the administrator of the platform</li> </ul>

<ul style="list-style-type: none"> <li>Name minimum specifications of ergonomics</li> </ul>	<ul style="list-style-type: none"> <li>Provide feedback about the learning activities</li> <li>Send alert notifications about important or urgent activities</li> </ul>
<b>CATEGORY 3. CONTENTS</b>	<b>CATEGORY 4. THE PART OF THE VIRTUAL TUTOR</b>
<ul style="list-style-type: none"> <li>Provide significant learning</li> <li>Encourage reflection</li> <li>Generate new knowledge through development activities</li> <li>Provide tools for professional education</li> <li>Provide tools for problem solving</li> <li>Guide the student into the topics through introductory activities</li> <li>Align the contents with the educational model</li> <li>Diversify the materials</li> <li>Define goals for each session</li> <li>Establish the academic requirements of the course</li> <li>Consider pedagogical implications</li> </ul>	<ul style="list-style-type: none"> <li>Guide the student</li> <li>Provide group and personalized orientation in an appropriate manner</li> <li>Channel the student when a special need has been identified</li> <li>Manage the teaching-learning process</li> <li>Adequately advice the students</li> <li>Instill institutional values</li> <li>Promote student's motivation</li> <li>Solve questions in an appropriate manner</li> <li>Moderate group interactions</li> <li>Encourage participation</li> <li>Facilitate collaborative work</li> <li>Promote responsibility in students</li> <li>Revise the VLE regularly</li> <li>Provide feedback for the final activities</li> <li>Consider the student as the center of the teaching-learning process</li> </ul>
<b>CATEGORY 5. INTERACTION WITH LEARNERS</b>	<b>CATEGORY 6. COMPUTER-ASSISTED MEDIATION</b>
<ul style="list-style-type: none"> <li>Create playful materials, mainly interactive multimedia</li> <li>Adhere to learning methodologies</li> <li>Produce an efficient instructional design</li> <li>Consider every learning style</li> <li>Production of diverse scenarios</li> <li>Show the follow-up of activities</li> <li>Give feedback for learning activities</li> </ul>	<ul style="list-style-type: none"> <li>Manage technological resources</li> <li>Manage time control</li> <li>Facilitate collaboration</li> <li>Allow participation</li> <li>Evaluation of learning through final activities</li> <li>Use several tools</li> <li>Facilitate the use of didactic resources</li> <li>Appropriation of information</li> </ul>

	<ul style="list-style-type: none"> <li>• Specify the technical requirements to take the course</li> <li>• Monitor groups</li> <li>• Always keep the VLE available (ubiquity)</li> <li>• Encourage self-growth in students</li> </ul>
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Once categories and strategies have been defined, we updated VTPs to include them. According to the instructional design model of Cookson (2003), we performed an analysis to determine where changes ought to be done; in the course generalities section we made recommendations on the physical environment and made an analysis on the ICTs we would use to improve learning experiences.

In the design and development stages we established and added more communication resources, we defined that feedback was essential for the learning activities by tutors, we changed the learning sequence and also reviewed and improved the contents in accordance with defined strategies.

For the implementation stage, we supplied training for all the tutors so that they would be aware of the new role of the virtual tutor, the new design strategies of VTPs, and so that the interaction with learners would be promoted, as well as to facilitate computer-assisted mediation.

Regarding the assessment stage, we selected a structured questionnaire as an instrument we administered in the classroom to the seven virtual tutors who partook to test VTP changes; the questionnaire included 58 closed questions grouped in accordance with the six categories of identified strategies.

The instrument was validated in accordance with the opinion of experts, we asked external PhD graduates for their support aimed to validate that the proposed objective in the research be complied with, as well as to obtain their opinion and contribution on the instructions and on the vocabulary used on the items. From the above, we defined the final questionnaire. Table 2 contains the items of the instrument grouped per categories.

**Table 2.** Items in the instrument.

Item	CATEGORY 1. PHYSICAL ENVIRONMENT
1	Are there any recommendations about space in the VTP?
2	Are temperature conditions established in the VTP?
3	Are there any recommendations about lightening conditions in the VTP?
4	Is the relevance of ventilation defined in the VTP?
5	Is a minimum technological infrastructure established in the VTP?
6	Are the minimum specifications of ergonomics mentioned in the VTP?
	CATEGORY 2. COMMUNICATION
7	Does the VTP implement synchronous communication through any meeting chat?
8	Does the VTP define means of asynchronous communication such as discussion forums?
9	Does the VTP allow sending messages about news and notices?
10	Does the VTP make the socialization of contributions possible?
11	Does the VTP include a contact with the administrator of the platform?
12	Does the VTP allow providing feedback for the learning activities?
13	Does the VTP make it possible to send alert notifications about important or urgent activities?
	CATEGORY 3. CONTENTS
14	Do the contents of the VTP facilitate significant learning?
15	Do the contents of the VTP encourage reflection?
16	Do the contents of the VTP produce new knowledge through development activities?
17	Do the contents of the VTP provide tools for the professional education of students?
18	Do the contents of the VTP provide tools for problem solving?

19	Do the contents of the VTP guide the student into the topics through introductory activities?
20	Do the contents of the VTP align the contents of the educational model of UTTEC?
21	Do the contents of the VTP have diverse materials?
22	Do the contents of the VTP define the goals of each session?
23	Do the contents of the VTP establish the academic requirements for the course?
24	Do the contents of the VTP consider the pedagogical implications?
CATEGORY 4. THE PART OF THE VIRTUAL TUTOR	
25	Does the VTP allow the tutor to guide the student?
26	Does the VTP allow the tutor provide group and personalized orientation in an appropriate manner?
27	Does the VTP allow the tutor to channel the student when a special need is identified?
28	Does the VTP allow the tutor to manage the teaching-learning process?
29	Does the VTP allow the tutor to advice students adequately?
30	Does the VTP allow the tutor to instill institutional values?
31	Does the VTP allow the tutor to motivate the students?
32	Does the VTP allow the tutor to solve questions in an appropriate manner?
33	Does the VTP allow the tutor to moderate the interactions between groups?
34	Does the VTP allow the tutor to encourage participation?
35	Does the VTP allow the tutor to facilitate collaborative work?
36	Does the VTP allow the tutor to promote responsibility in the students?
37	Does the VTP allow the tutor to revise the platform regularly?
38	Does the VTP allow the tutor to give feedback for the final activities?

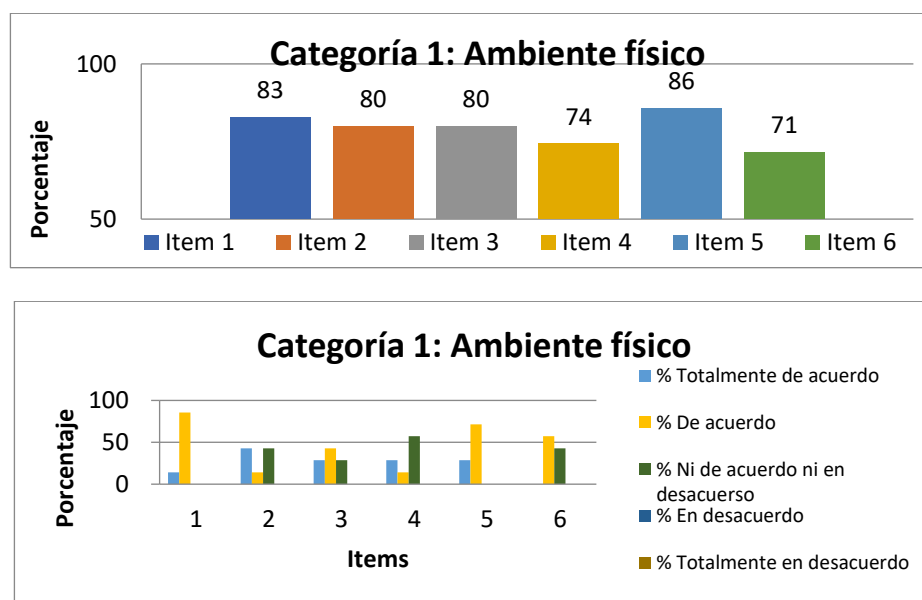
39	Does the VTP consider the student as the center of the teaching-learning process?
CATEGORY 5. INTERACTION WITH LEARNERS	
40	Is the interaction in the VTP given by playful materials and interactive multimedia?
41	Does the interaction in the VTP adhere to the learning methodologies of UTTEC?
42	Does the interaction in the VTP include an efficient instructional design?
43	Does the interaction in the VTP consider every learning style?
44	Does the interaction in the VTP include diverse scenarios?
45	Does the interaction in the VTP allow for the follow-up of activities?
46	Does the interaction in the VTP allow to give feedback for learning activities?
CATEGORY 6. MEDIATION VIA COMPUTERS	
47	Does the VTP allow the management of technological resources
48	Does the VTP facilitate time management and control?
49	Does the VTP facilitate collaboration?
50	Does the VTP allow participation?
51	Does the VTP contribute to the evaluation of learning through final activities?
52	Does the VTP allow the use of several tools?
53	Does the VTP allow enabling the use of didactic resources?
54	Does the VTP favor the appropriation of information?
55	Does the VTP specify the technical requirements to take the course?
56	Does the VTP allow monitoring groups?
57	Does the VTP keep the VLE available 24 hours a day?
58	Does the VTP allow encouraging self-growth in students?

## RESULTS AND DATA ANALYSIS

The results described herein were obtained by means of a questionnaire to the seven tutors, who served as virtual tutors in the VTP updated with new strategies in the May-August 2019 term. In order to measure them we used the Likert scale, which is one of the most used tools in social sciences (Matas, 2018). The scale alternatives we used were; (5) strongly agree, (4) agree, (3) neither agree, nor disagree, (2) disagree, (1) strongly disagree.

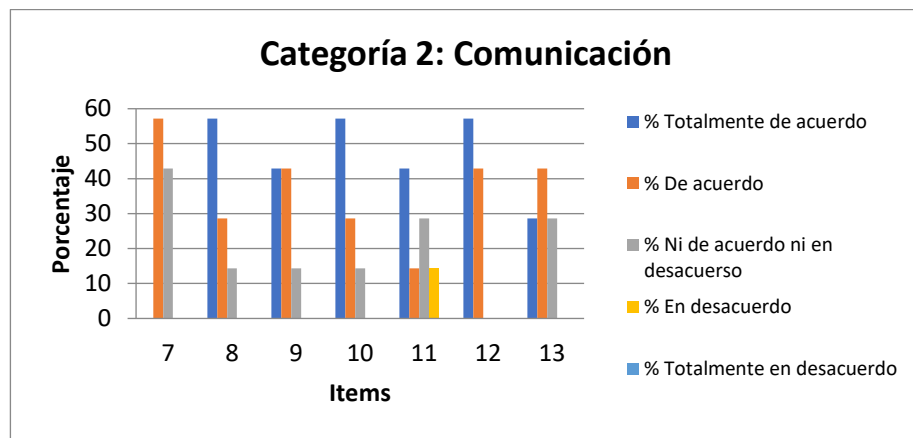
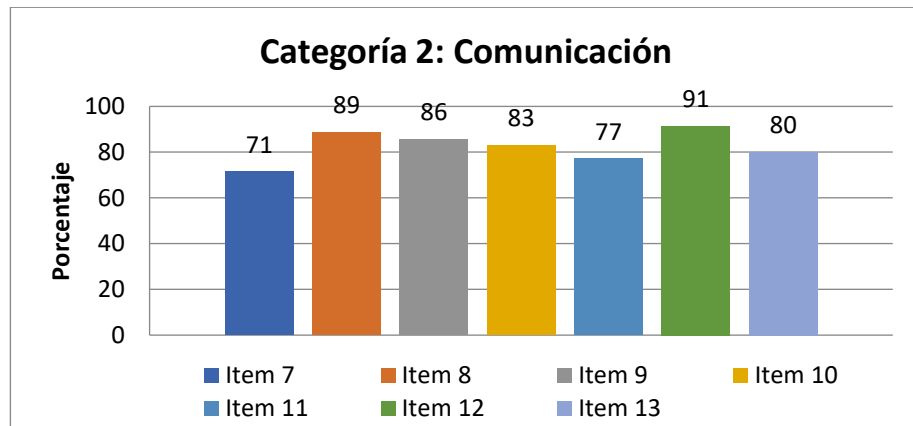
Data analysis was performed from results obtained in the categories of the questionnaire. In order to validate results, we also triangulated the theoretical section, the researchers' analysis and the results of the questionnaire administered.

We included the results of category 1 in chart 1 on the physical environment: the first box shows that item 5, which refers to the minimal technological infrastructure, was the best evaluated, as it reached 86% satisfaction, whereas item 6, which refers to ergonomics, obtained the lowest result, with 71%, this means that more attention ought to be given to the platform in said aspect. The second box in this chart contains detailed results for each of the six items.



**Chart 1.** Results of category 1: Physical environment.

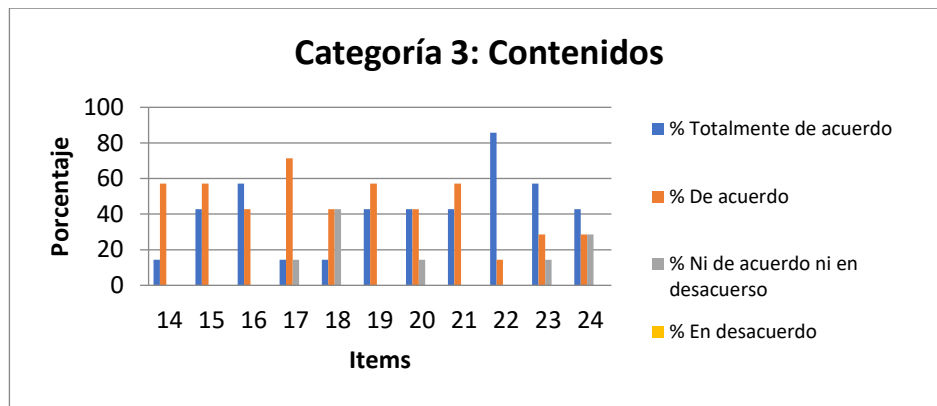
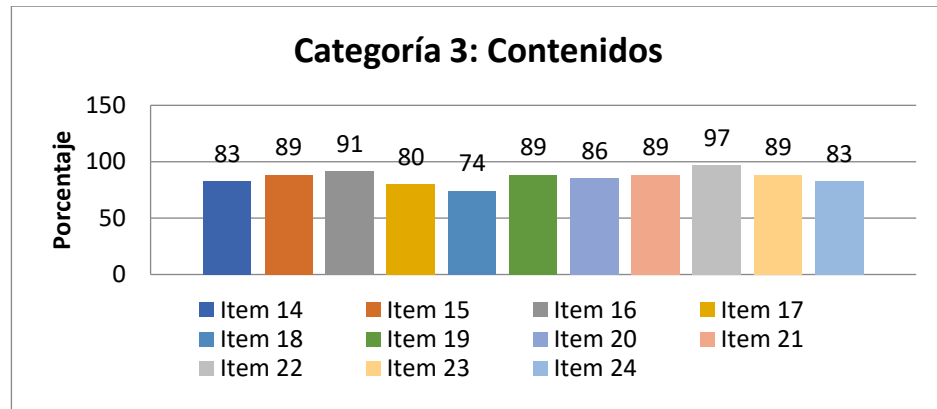
Chart 2 shows the results of category 2: communication. In the first box we note that item 12, which refers to providing feedback for the learning activities, was best evaluated with 91% satisfaction, whereas item 7, on synchronous communication by means of a chat group, was the lowest, with 71% satisfaction. This shows that the chat tool is not used as expected and should be improved. In the second box of this chart, we can see detailed results for each of the seven items.



**Chart 2.** Results of category 2: Communication.

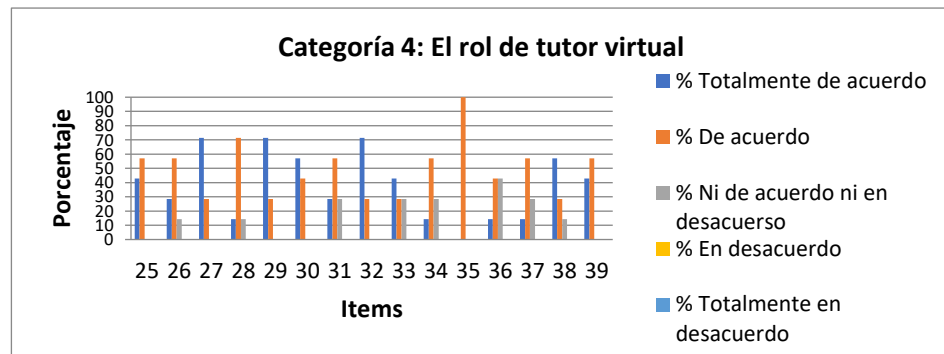
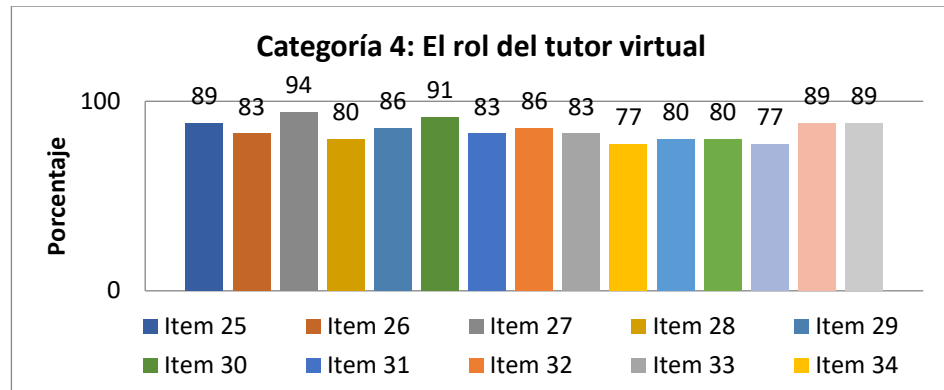
Chart 3 contains the results of category 3, concerning contents. In the first box it is recorded that item 22, in respect to whether they define the objectives per session, was best evaluated, with 97% satisfaction; whereas item 18, related to problem-solving tools, was the lowest, with 74%, which means that it is necessary to update the

contents aimed to focus, mainly, in providing solutions to practical problems. The second box in this chart shows detailed results for each of the eleven items.



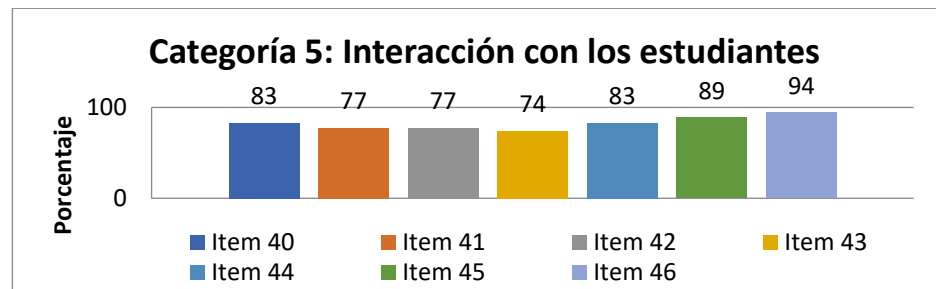
**Chart 3.** Results of category 3: Contents.

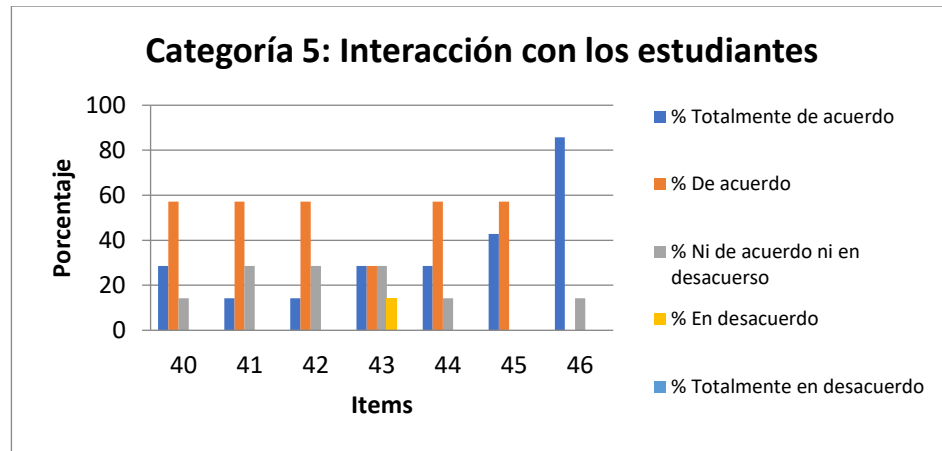
Chart 4 shows the results of category 4, in respect to the role of the virtual tutor. The first box, item 27, shows whether VTPs allow the tutor to channel the learner when a special need is identified, this was the best result as 94% satisfaction was obtained, which shows that tutors are facilitated to channel special cases, and items 34 and 37, on whether VTPs allow the tutor to encourage participation and review the platform from time to time, are the lowest, with 77% satisfaction; therefore, we noted the need to establish elements to encourage learners so that they are available at all the times in the platform. In the second box in the chart, we can see the items in detail.



**Chart 4.** Results of category 4: The role of the virtual tutor.

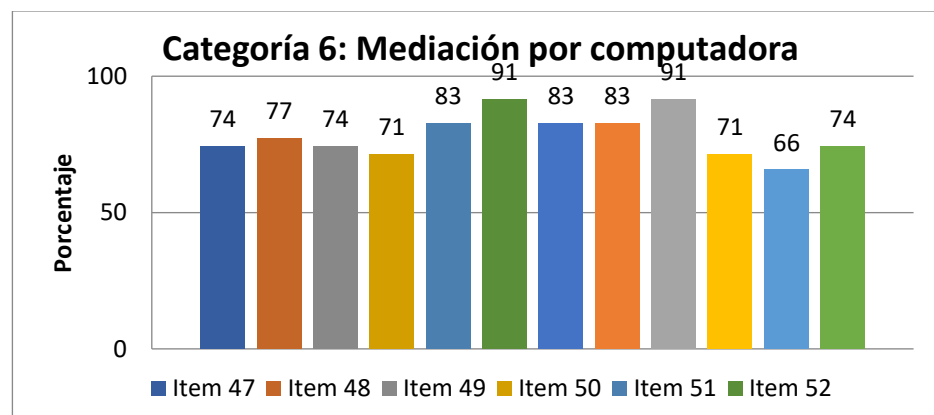
Regarding category 5, interaction with learners, chart 5 shows the results. In the first box it is seen that the best evaluated item was 46 which refers to whether VTPs enable feedback of the learning activities, with 94% satisfaction; item 43 was the least evaluated, with 74%, regarding whether the interaction in VTPs considers every learning style, hence we may affirm that a review of the interaction is necessary to ensure that all the learning styles are considered. The second box in the chart shows detailed results for each of the items.

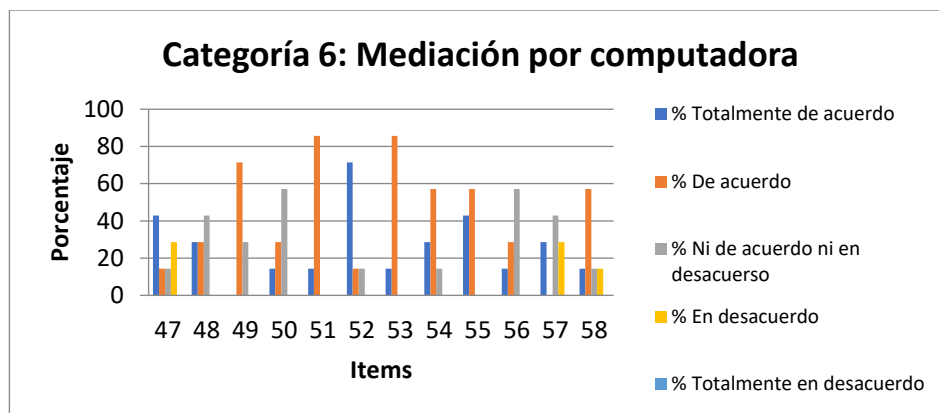




**Chart 5.** Results of category 5: Interaction with learners.

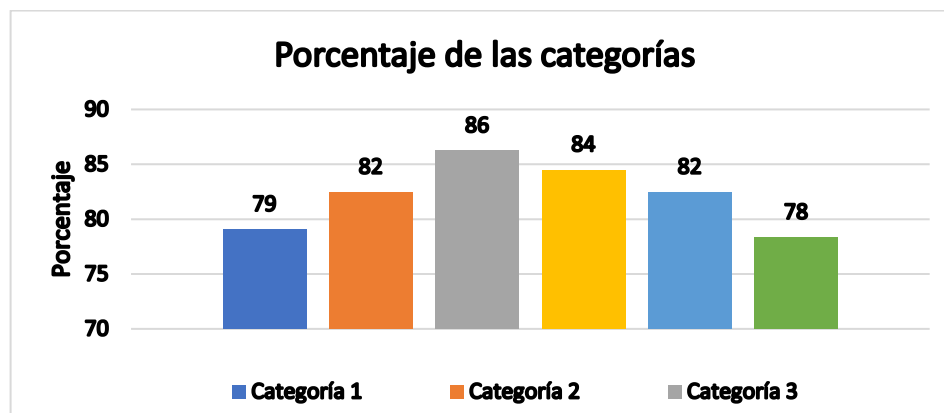
The results of category 6 on computer-assisted mediation are shown in chart 6. Here, we noted that there were two items with a higher acceptance percentage in the upper box, 52 and 55, with 91%, which address the use of multiple tools and whether technical requirements are specified to take the course; the lowest percentage item is 57, with 66%, regarding whether VTPs keep VLEs available 24 hours a day. From this principle, we can state that it is important to improve server availability, since, at times, due to maintenance its operation was interrupted. We can see all the items in the second box of this chart.





**Chart 6.** Results of category 6: Computer-assisted mediation.

To complete the analysis and the results, we carried out a comparison analysis of each of the categories. Chart 7 reveals that the best evaluated category was on content strategies, with 86% satisfaction; whereas we noted that the lowest is the category including computer-assisted mediation strategies, with 78% satisfaction. We can assert that it is imperative to improve technological aspects, because, although it is difficult to have total control upon them, it is necessary to find a way to use them.



**Chart 7.** General results of the categories.

## DISCUSSION

In spite that the virtual tutorship project in a VLE was originally performed under a strict instructional design model, the evaluation results revealed that it was necessary to improve it and that the section on pedagogic mediation in the platform had to be more

efficient. Hence, the research presented herein, where we defined six techno-pedagogical mediation strategies for VTP, which arose as part of the work of a group of experts in the areas of tutorship, pedagogy, ICTs, contents and VLE (Morales, Infante-Moro & Gallardo-Pérez, 2019), and that were evaluated by the tutors.

From the analysis of the results, we identified the strengths of these categories. In accordance with the percentages obtained, the category which refers to contents obtained the best result, which is an indication that VTP resources, generally, are well defined and facilitated significant learning in accordance with the educational model.

In contrast, the area of opportunity of the project comprises strategies of category 6 linked to computer-assisted mediation. It is believed that this category obtained the lowest result because, at the institution, current limitations include the bandwidth and the availability of the server; this happens because other applications are lodged in this equipment affecting the performance of VLE. Nonetheless, the results allowed us to make arrangements to acquire a server set aside for this project, with which the service will be improved. With regards to the other categories, although there are no significant differences, a continuous improvement process is always recommended in techno-pedagogical mediation.

## **CONCLUSION**

Within the university environment, complex problems of different disciplines are usually analyzed; in the specific case of the technological university, focusing on practice, it is important to have a VLE to support the tutorship and to enrich the learning experiences of learners aimed to strengthen their professional instruction. When working with a VLE, it is necessary that at the same time, both the technological and the pedagogical parts are taken into account, and that they converge in a techno-pedagogical mediation that would make the teaching-learning process flexible and facilitate collaboration among participants.

In this project, the use of ICTs is paramount as in the higher level technological competences comprise a substantial part in training learners. Through these, learning is made possible on the VTP; it is important to keep in mind that they only are a tool or a means to attain objectives and that they do not work on their own. It is necessary to take the pedagogic approach of the institution into account so that they really are effective.

Implementing improvements to the VTP project was a good experience thanks to the participation and availability of tutors, who tested the new strategies directly with their learners in a full four-month term and who evaluated them, proving that they are aware of the relevance of their participation, their commitment with the institution and, above all, with their tutored learners. Their contributions are valuable for the continuous improvement of the project.

According to the results obtained from the questionnaire applied to the tutors and to the fact that 66% of the categories produced a satisfactory result greater than 80%, we believed that the purpose to improve the efficiency of VTPs was fulfilled in the teaching-learning process, by implementing defined strategies. By this improvement, the technological tools used were better taken advantage of and better communication, dynamic interaction among learners, tutors, materials and contents were attained; however, work should still be done on the evolution of the project with innovative strategies and to prioritize computer-assisted mediation.

The main contribution of our research comprises proposed categories and strategies, which may be applied to any VLE within the model of universities of technology aimed to promote improvements to communication and interaction among participants; they also help learners to be more flexible and concerned in their learning process. Regarding tutors, this provided them a means of achievement of ICTs aimed to improve the teaching-learning process. As a future work, we intend to bring more gamification elements to make the tutorial process more amusing and attractive.



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