Material design for mixed environments at UTSV

Diseño de material para ambientes combinados en la UTSV

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Abstract

In the Technological University of Southern Veracruz was carried out the process of material design combined environments, to get it performed certain activities such as: Identify actors intervedrían therein, awareness about digital inclusion, training teachers multipliers styles and types of learning, instructional design, reagents , in order to create meaningful material that included cognitive development of the hemispheres practices that fostered the acquisition of skills and attitudes . The validation of the material was performed by the process of implementation, monitoring and continuous improvement to ensure quality. It is intended that by designing meaningful material a change in students by encouraging their productive role in detrminado context.

Resumen

En la Universidad Tecnológica del Sureste de Veracruz se llevó a cabo el proceso de diseño de material para ambientes combinados, para poder conseguirlo se realizaron ciertas actividades como: Identificar a los actores que intervendrían en el mismo, concientización sobre la inclusión digital, capacitación a docentes multiplicadores en estilos y tipos de aprendizaje, diseño instruccional, de reactivos, con la finalidad de crear material significativo que incluyera prácticas cognitivas para el desarrollo de los hemisferios que propiciara la adquisición de habilidades y actitudes. La validación del material se realizó mediante el proceso de aplicación, seguimiento y mejora continua para asegurar la calidad. Se pretende que mediante el diseño de material significativo se produzca un cambio en el alumno, fomentando su función productiva en un contexto determinado.

Design, Material, UTSV

Diseño, Material, UTSV

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Introduction

Globalization opens the possibilities for multinational jobs and with it the need to raise the educational level. The Mexican educational system has gone through various paradigms, in order to improve, training the student for the work context, where the cognitive, pragmatic and axiological level are the basis for the professional development of the student. The educational system by competencies requires interaction with the physical world, knowledge, information processing, in order to achieve this there are various models for the teaching-learning process, which have evolved, adopting new techniques and digital inclusion.

The university professor faces new challenges every day in his professional work. Universities have ceased to possess the monopoly of knowledge that they held for centuries (Salinas, 1998); The paradigm of collaborative learning has changed. Comodice Salinas (Salinas, 2004) All this requires higher education institutions to make their procedures and administrative structure more flexible, in order to adapt to alternative training modalities more in line with the needs of this new society. presents.

The Universidad Tecnológica del Sureste de Veracruz (UTSV), derived from the prevailing technological need, intends to adopt an innovative educational model that combines face-to-face and virtual learning, called blended learning. B-learning takes advantage of technological resources, turning them into a powerful tool that affects meaningful learning Likewise, taking the advantages of physical interaction, fostering motivation in students and offering the opportunity to perform

Literature review

According to UNESCO (2006) "it is intended to improve the practice of teachers in all areas of their professional performance, combining skills in information and communication technologies (ICT) with innovations in pedagogy, the study plan (curriculum) and the school organization; coupled with the purpose of getting teachers to use ICT skills and resources to improve their teaching strategies, cooperate with their colleagues and, ultimately, be able to become leaders of innovation within their respective institutions ".

Face-to-face education is not fully developed since it incorporates technological elements, in order to support the presentation of content, manage learning and collaborative work, through the use of educational platforms and other resources available on the web. It is an undeniable fact as it mentions that the addition of ICT in the processes has favored the appearance of roles different from those traditionally developed by teachers, since they induce the adoption of strategies and teaching styles more focused on the student.

"Achieving the integration of ICT in the classroom will depend on the ability of teachers to structure the learning environment in a non-traditional way, merge ICT with new pedagogies and promote dynamic classes at the social level, stimulating cooperative interaction, learning collaborative and group work.

What requires acquiring a different set of competences to manage the class, the fundamental competences will include the ability both to develop innovative methods of using ICT in the improvement of the learning environment, as well as to stimulate the acquisition of basic notions in ICT, deepen the knowledge and generate it. The professional training of teachers will be a fundamental component of this improvement in education. However, teacher professional development will only have an impact if it focuses on specific changes in their behavior in the classroom and, in particular, if this development is permanent and harmonized with other changes in the educational system "(Makrakis, V. , 2005).

According to Mena, for the teacher to be successful, eleven basic competencies must be developed, such as: use of academic platforms, communication skills, subject matter mastery, technical support, mastery of communication strategies, interpersonal communication, mastery of learning strategies, work in equipment, materials design, as well as knowledge and use of ICT.

The use of ICT in the teaching-learning process allows the acquisition of technological competences by students, useful for the educational process and for subsequent professional practice. Digital literacy has been essential in competency training, being promoted by different international and national institutions.

It has influenced the transition from traditional user training to competence-based training (C12- Informational and computer skills) in order to improve the quality of education, being supported in libraries in information and learning resource centers. Taking the web 3.0 as a motivational framework for the interaction between the learning subjects (Morales F., et. Al., 2014).

Methodology

The Universidad Tecnológica del Sureste de Veracruz (UTSV) has approximately 1,515 students, with an area of influence of more than five cities, gaining ground over more than ten years, positioning itself as a highly prestigious institution, socially responsible with the strong conviction to provide its students with a comprehensive, quality education under a scheme of professional skills.

The process for the design of material for combined environments in the UTSV took over two years, carrying out various actions, such as:

- Identify the actors, being the people who intervene directly in the design of the material.

Student: End user of the material developed for the platform in mixed environments, they must identify the environment.

Teacher: Facilitator of the class supported by the material for mixed environments, also covers the role of designer teacher.

Designer teacher: person in charge of developing the virtual content, identifying the content of each subject, the instruments that must be made, products and performances to be evaluated. Multiplier: it is the teacher who propagates the courses and appropriate techniques for the relaying of activities under the scheme of combined environments.

Technician: person responsible for the platform.

- Train teachers: this process is essential in the realization of material for mixed environments, since it analyzes how to learn and knowledge management.

To relate effective material, various courses were taken in order to promote the development of meaningful material.

Learning styles: a style denotes a way of being and doing, and although they can be classified by groups, there are individual differences caused by experience, social and cultural context as well as personality.

Figure 1 Knowledge management process

It is important that the teacher knows the learning styles that exist and that their students may have, however it is essential that each student knows how to identify their own learning style so that they do not learn as they think is correct, since when creating In his own method, the student leaves gaps, causing his use and processing of information not always to be the most optimal based on the expected results (Crozer, 1997).

It is important that the teacher when designing the material, can include activities for each style or to promote its development, as well as detect during the march and focus the activities for a better use, in order that the information is acquired by some sense, to form structures or representations of the information giving it a visual, auditory or kinesthetic meaning. The activity of the hemispheres helps to organize the information received, for the logical hemisphere, the practice of diagrams, readings, writings is recommended, for holistic ones, mind maps, exemplifications and artistic activities are recommended, for the development of both hemispheres it is recommended poetry, brain gymnastics and body activities. (Willis, 2007)

Learning activities for mixed environments must be designed to promote perception, organization, information processing, exercising cognitive levels.

Virtual learning environments: It is understood by the physical space where new technologies such as: satellite systems, the internet, multimedia and interactive television, among others, have been strengthened, favoring the knowledge and appropriation of content, experiences and pedagogical processes . They are made up of the space, the student, the advisor, the educational content, the evaluation, and the information and communication media. When distance education courses are designed, careful planning is carried out, the objectives to be achieved, as well as the selection of topics that allow the development of content, the means to be used as well as the activities and the evaluation of learning.

To do this, the target audience, the institutional infrastructure and the learning subjects, institutional and curricular objectives, and instructional materials must be taken into account. (Avila, et al., 2001).

For the technical part, a training course must be taken on the platform in particular, in order that its management is efficient and punctual.

Pedagogical Resources: according to UNESCO, they are quality teaching materials. These resources that are used have the same purpose, the induction of learning and procedures for the efficient management of information.
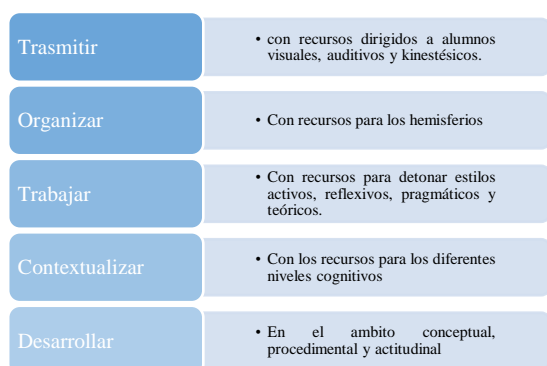
According to their objective they are:

Figure 2 Pedagogical resources

The teaching process has two phases:

Transmission phase that consists of the way in which the information is presented to the student. In order to carry out the effective transmission, the different types of students that we have, the auditory, kinesthetic and of course the visual, must be taken into account. For the pedagogical resource to have the desired impact, the following criteria can be taken into account:

Teaching Strategies		
Visual	**Auditory**	**Kinesthetic**
Images, photographs	Audiobooks	Puzzle
Multimedia content	Radio	Models
e-book	Music therapy	Roleplay
Digital manuals	Dialogues	Practical exercise
Online questionnaires	Video with audio	Field research
Crosswords		Relate
Virtual encyclopedias		
Conceptual maps		
Videos		

Figure 3 Pedagogical resources - student types

Processing phase: it is how the student works the information received in order to use it, based on the cognitive levels. Among these are the conceptual, procedural and attitudinal. For the student to organize the information received (acquired by various means depending on the type of student), it is important to use resources that promote it. For this, it is necessary to work with the cerebral hemispheres through activities that promote it.

Logical hemisphere	Holistic Hemisphere
Make outlines	Make concept maps
Give rules	Give examples
Explain step by step	Start by explaining the big idea
Read the texts from the beginning	Start by reading the end of the text to know where it is going to end
Write a text from photos or drawings	Convert a text into a comic
Organize in sections	Organize by colors
Give reasoned opinions	Express emotions and impressions

Figure 4 Pedagogical resources - cerebral hemispheres

The pedagogical resources to contextualize and develop student learning go hand in hand, to define the taxonomic level to be reached, as well as the area to be developed, such as conceptual, procedural and attitudinal (knowing, doing and being)

Instructional and reagent design: According to Broderick (2001) it is the art and applied science of creating an instructional environment and clear and effective materials that will help the student develop the ability to achieve certain tasks.

By producing educational material appropriate to the needs of students, it contributes to ensuring their quality.

According to Frida Díaz (2005), with the inclusion of ICT in the teaching-learning process, these allow not only to flatten geographical distances and expand coverage, but above all to provide instruction in a more efficient and effective way.

Teachers hope first and foremost that technology will help them show their students better examples of the concepts and principles they teach, almost unlimited and personalized opportunities to perform a procedure, learn a technique or correct mistakes, and above all, achieve an environment of more entertaining or motivating learning (Duffy & Cunningham, 2001), cited by Frida Díaz (2005). For the creation of reagents, the cognitive levels to which they are intended to reach are taken into account, using Bloom's taxonomy.

– Information curation: based on the content curation model developed by Francisca (Negre et. Al., 2014) that comprises the following phases:
– Planning the process based on the need for specific information.
– Creation of a container space and selection of information sources.
– Assessment of information received.
– Assignment of metadata for its conservation and storage.
– Use and reuse to share with others.
– Transformation into new knowledge.

Figure 5 Healing model applied in the didactic strategy followed

This model has been applied and validated in different cycles. The implementation context, application phases, validation process, as well as the results obtained when applied between different groups of students of the same subject, where the strategy to identify, assess and share content of interest, are described. Therefore, it is extremely enriching that the contents established in the materials in mixed environments go through a healing process, which will allow the student to build their knowledge through quality material.

– Use adequate structure for the material: According to Reyna (Reyna et. Al., 2014) the navigation of the content of the material for combined environments must be sequential and systematic, which will allow the learning curve to be covered in the same way.
– For the correct interaction of the material established on the platform, two facilitators are required, one for the theoretical - methodological part and the other for the technical environment.

The design of the material for combined environments was carried out according to the instructional taxonomy for the design of platform courses, developed by Reyna (Reyna et. Al., 2014), which consists of the following.

Instructional Taxonomy of an LMS-based course	
Purpose	Course
Learning guide	
Teaching object -Activities -Forum	Learning unit, topic, block, other.
Teaching materials	
Evaluation	
Reference sources	Course
Authorship and credits	

Figure 6 Instructional taxonomy (Reyna, 2014)

By uniting each of the elements, two great actors are obtained: technical and theoretical - methodological, which require training.

The technical part is responsible for the management of the platform, creation of user accounts, courses, assignment of roles as well as enrollment, user service.

The theoretical methodological part includes the realization of the course content, where various actors intervened:

Multiplying teachers who are those who were trained to develop quality material.

Designer teachers are the teachers who, together with the multipliers, carry out the information curation process.

User teachers, who interact with the platform and the material developed for it.

For the realization of the material for combined environments the multiplier teachers, designers created various pedagogical resources.
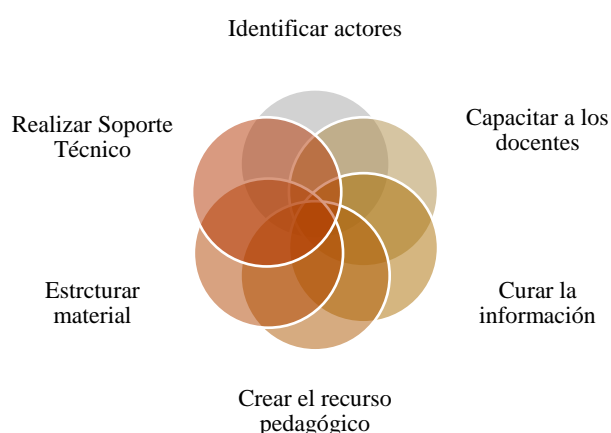

Figure 7 Sketch of the model for material in mixed environments

For the creation of pedagogical resources, the different types of students, learning styles, evaluations, feedback must be taken into account.

Results

To test the material design model for combined environments, the technical and theoretical methodological elements were taken into account.

In the technical part, Moodle was used as a tool for the virtual platform, where the structure was followed to present the information indicated in the model. Regarding the methodological aspect, the target population was considered, taking into account:

The types of students and learning styles, in order that the pedagogical resources developed are used both in person and online, thus contributing to the construction of the teaching-learning process, in the conceptual, procedural and attitudinal fields, promoting the development of the competencies.

Various types of questionnaires were carried out according to the desired objective. The reinforcement ones allow the student to enter the desired times and answer them. Those of self-evaluation favor introspection, those of evaluation, for their part, support the facilitator to identify areas of opportunity.

Regarding performance and product activities, they are requested according to different learning styles, be it metal maps, concept maps, essays, videos of practical work, as well as summaries or synthesis from videos, exhibitions, social participation. , case study among others to assess knowledge.

Activities			
Questionnaire (closed questions, complement, comprehension, mixed)	Beef up		
	Evaluate		
	Self appraisal		
Questionnaire	Self appraisal	Decision making and justification	Retroalimentación
		Goals and scope	
		Suggestions and compromises for better learning	
	Understanding of Concepts		
	Synthesis and evaluation of situations		
	Concept application and analysis		
	Participation in web 2.0		
	Presentation via the cloud		

Figure 8 Performed activities

In each of the previous activities, work was done under a scheme of cognitive levels, using Bloom's taxonomy, supported by the instructional design and reagents, to promote effective communication as well as the use of cured material, the latter being filtered by the user teachers, designers and multipliers, always in search of the development of professional skills.

At the end of the implementation of the model, the impact was measured through constant observation and through surveys carried out with the different actors involved in it, obtaining the following results.

Material design is affected by four main causes.

Comunicación	Reactivos	Herramientas	Material
• Recursos pedadógico empleado por el facilitador • La estructua del contenido es atractiva. • La utilización de recursos según necesidades.	• Los niveles taxonómicos empleados • Redacción adecuada	• Dominio de la plataforma para ambientes virtuales. • Usabilidad de la plataforma. • Uso de harramientas adicionales.	• La información contenida en la plataforma es adecuada a la asignatura desarrollada • Material disponible de forma oportuna

Figure 9 Results obtained

Of the surveyed students:

100% agree that the information contained is attached to the study plan, 80% that the material developed is of quality and attractive. 80% think that the reinforcement questionnaires are useful as they serve as training for their evaluation. They think it is appropriate for the platform activities to be contained in the same place where they can deliver them or be able to enter the forum to solve doubts.

Of the 25 teachers involved, it is concluded that the structure provided to present the material is flexible, it adapts to the thematic contents, the design of the reagents was the most complicated part of the material design, since they had to adhere to the instructional design and taking into account the taxonomy, in addition to the selection of contents, it is possible to work collaboratively with teachers who share a subject, originating quality filtered material. Teachers users of the platform and the material, the information contained is relevant, appropriate to the content as well as specific teaching material.

At the end of the process, each of those involved agrees that the design of the material is the most important task, it requires a strong investment of time since it is intended that this incur in the student in a significant way, in such a way that the teachers are facilitators and students build their knowledge by acquiring the necessary skills.

Conclusions

In this research, different points of the construction of material for blended learning have been approached, making a mixture of different investigations carried out and tested, with the aim of developing quality material, seen from the different phases of material design.

The results indicate that factors such as geographical, social, and cultural must be taken into account in the development of materials for combined environments, carrying out collegiate work for the selection of information, development of the didactic resource.

A new paradigm for the use of reusable teaching material opens, the implication of which is to take what is still relevant and update what is necessary, working together, including information technologies.

By combining learning, the aim is to promote different types of competences, in the face-to-face classes it is sought to strengthen linguistic competence, knowledge and interaction with the physical world, social and civic, cultural and artistic competence, learning to learn, with the virtual part Information processing competence and digital competence are promoted, as well as autonomy and personal initiative.

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