MENDIVE

REVISTA DE EDUCACIÓN

Translated from the original in Spanish

Construction of hypertexts for the career of Engineering in Agribusiness Processes in distance education

Construcción de hipertextos para la carrera de Ingeniería en Procesos Agroindustriales en educación a distancia

Construção de hipertextos para a carreira de Engenharia em Processos Agroindustriais no ensino à distância

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ABSTRACT

At the Agrarian University of Havana, since 2016 the first experiment has been carried out for the implementation of the Distance Education Model of the Cuban Ministry of Higher Education in a career with an agricultural technical profile. For this, the career in Agro-Industrial Process Engineering was selected. The production of hyper medial resources for this modality constitutes an element that highlights the approved model. The present work, in correspondence, had the objective of making a diagnosis of the construction of hypertexts aimed at distance education, in the career of Engineering in Agro industrial Processes. The operational definition of the fundamental variable was started and the dimensions and indicators associated with it were determined. Subsequently, the analysis of various applied instruments was carried out: observation, analysis of user registries, semantic Osgood differential, semi-structured group interview and focus group, which allowed the analysis of the behavior of the study variable. Finally, from the analysis of the applied instruments, the force field analysis and the cause-effect diagram or Ishikawa fishbone were performed. It is revealed in all the processing, the existence of deficiencies in the construction of hypertexts associated with the preparation of teachers and the command of hypermedia language.

Keywords: Construction of hypertexts; Distance Education; Hypertext.

RESUMEN

En la Universidad Agraria de La Habana desde el año 2016 se lleva a cabo el primer experimento para la implementación del Modelo de Educación a Distancia del Ministerio de Educación Superior de Cuba en una carrera de perfil técnico agropecuario. Para ello, se seleccionó la carrera de Ingeniería en Procesos Agroindustriales. La producción de recursos hipermediales para esta modalidad constituye un elemento que destaca el modelo aprobado. El presente trabajo, en correspondencia, tuvo como objetivo realizar un diagnóstico de la

construcción de hipertextos dirigidos a la educación a distancia, en la carrera de Ingeniería en Procesos Agroindustriales. Se partió de la definición operacional de la variable fundamental y se determinaron las dimensiones e indicadores asociados a ella. Con posterioridad se realizó el análisis de varios instrumentos aplicados: observación, análisis de los registros de usuarios, diferencial semántico de Osgood, entrevista grupal semiestructurada y grupo focal, que permitieron el análisis del comportamiento de la variable de estudio. Por último, a partir del análisis de los instrumentos aplicados, se realizó el análisis de campos de fuerza y el diagrama causa-efecto o espina de pescado de Ishikawa. Se revela en todo el procesamiento la existencia de deficiencias en la construcción de hipertextos asociados a la preparación de los docentes y el dominio del lenguaje hipermedial.

Palabras clave: construcción de hipertextos; educación a distancia; hipertexto.

RESUMO

Desde 2016, a Universidade Agrária de Havana realiza a primeira experiência para a implementação do Modelo de Educação à Distância do Ministério do Ensino Superior cubano em uma carreira com perfil agropecuário técnico. Para isso, foi selecionada a carreira de Engenharia em Processos Agroindustriais. A produção de recursos hipermídia para esta modalidade é um elemento que destaca o modelo aprovado. O presente trabalho, em correspondência, teve como objetivo fazer um diagnóstico da construção de hipertextos direcionados à educação à distância, na carreira de Engenharia em Processos Agroindustriais. O ponto de partida foi a definição operacional da variável fundamental e as dimensões e indicadores associados a ela foram determinados. Posteriormente, vários instrumentos aplicados foram analisados: observação, análise de registros de usuários, diferencial semântico de Osgood, entrevista semiestruturada em grupo e grupo focal, o que permitiu a análise do comportamento da variável de estudo. Finalmente, com base na análise dos instrumentos aplicados, foi realizada a análise do campo de forças e o diagrama de causa-efeito de Ishikawa ou espinha de peixe. Revela-se em todo o processamento a existência de deficiências na construção dos hipertextos associados à preparação dos professores e ao domínio da linguagem hipermedial.

Palavras-chave: construção de hipertexto; educação à distância; hipertexto.

INTRODUCTION

In Cuba the Ministry of Higher Education (MES), strives to implement changes in their institutions throughout the country. In June 2016, the new model of Distance Education of Cuban Higher Education was established, which was developed in line with the "Guidelines for Economic and Social Policy of the Party and the Revolution, "which sets out the objectives of give continuity to the improvement of education, raise the quality, rigor and effectiveness of the educational teaching process. The document in question prioritizes permanent improvement, trying to make audiovisual means a complement to the work of the teacher and increase enrollment according to the needs of the economic and social development of the country; Furthermore, it facilitates the conditions for workers to study (Quintero, Torres, Figueroa & Pérez, 2020).

At the UNAH, since 2016, a pilot experiment has been carried out for the implementation of the MES Distance Education Model in a career with an agricultural technical profile. For this, the degree in Engineering in Agro industrial Processes (IPAI) was selected, which until then was only offered in the blended studies modality; there was also no previous experience in Cuba of opening technical careers in distance education (Quintero León et al., 2020). This undoubtedly constituted a challenge to face from the university, generating therefore the need to produce relevant educational resources for the development of this type of studies.

An important role in the implementation of the Distance Education Model, has played the Laboratory of Educative Technology (LATED) of this institution, which, since its inception, is a national benchmark for the MES. There are several investigations (Torres, Iriarte & Pérez, 2016; Hernández, Torres & Lombillo, 2018) that have been developed since the results of LATED's work and that in some way contribute to the implementation and production of digital, hypermedia and Adaptive resources for distance education.

The theoretical investigations carried out allowed identifying, in the work of these researchers, some difficulties in the design, use and reuse of digital resources in teaching-learning contexts mediated by ICT. In particular, it was possible to observe that all agree that there are insufficient flexibility and adaptability of learning resources, based on a distance learning process focused on the student and their independent activity.

A digital educational resource par excellence is the hypertext, by enabling the student to read non-linearly, which allows him to establish a personalized route for self-learning, also offering a system of help from other resources, with which he is linked in his navigation map.

From the early beginnings of hypertext, authors like Landow (1995), predicted a revolutionary change regarding the conceptual systems of the text based on notions such as center, margin, hierarchy and linearity, replaced by others of multiline, nodes, links and networks.

The justifications for a use of hypertext in distance education are based, above all, on its particular characteristics: texts connected to each other by links, the different itineraries for the user and a more self-directed learning mode (Socas, Torres & Pérez, 2020).

The aim of this work is to diagnose building hypertexts aimed to distance education, in the career of Agro industrial engineering Processes (IPAI) in UNAH. To do this, several techniques were used to collect information that allowed revealing the driving forces and constraining, as well as the major cause and effects associated to the fundamental variable.

MATERIALS AND METHODS

The research covers the period from September 2017 to June 2019. The result responds to the project associated with the National Program Implementation of the distance education model of the MES in the Agro industrial Engineering Process in the UNAH. Specifically, it is directed to producing adaptive hypermedia resources, and in this case the hypertext and it is limited, to the line of use of advanced technologies in higher education and distance learning sub line.

For the Research, a population represented by 21 teachers or tutors of the career of IPAI of the UNAH in the

2019-2020 course, which represents 100 %, six directors of the faculty of technique Sciences, methodology teaching principal of the UNAH and four experts on the subject, from the MES were selected.

Semi - structured Group interview, was focused on managers and teachers who hold responsibilities related to the career of Technical Sciences faculty and of Agronomy of them six were selected: (Dean, Associate Dean Professor, Chairman of the National Commission of the IPAI career, Coordinator of the IPAI Career Collective at UNAH, Teaching Methodological Director and Director of the Educational Technology Laboratory).

A survey was applied to the 21 professors of the IPAI degree program for the processing of the "Osgood semantic differential" scale. The observation was applied to 100 % of the hypertexts that are housed in the Repository of Learning Objects (RUNAH) (http://runah.unah.edu.cu) and in the virtual classroom of the IPAI degree (http://evea.unah.edu.cu).

Applying Focus Group, Analysis of the Force field and Diagram Fishbone Ishikawa techniques it was carried out with the six principals of the Faculty of Technical Sciences interviewed and to a group of four teachers who make up the group of experts in Distance Education of the MES, who have mastery of the research topic.

It was assumed as a variable the construction of hypertexts for distance education is conceived by the authors as a complex linguistic process, based on short segments of information called nodes that relate to other nodes through links called hyperlinks, to give rise to an interactive environment (hypertext), which allows collaborative work, communication and the acquisition of knowledge, with the support of different educational resources in various digital formats, which promote and stimulate the autonomous learning of the student in the distance educational modality, characterized for the separation of the teacher and the student in time and space.

The dimensions associated with this variable, from the systematized theoretical references are: Textual, Hyper medial, Pedagogical and Technological (Table 1).

Table 1 - Dimensions and indicators of the fundamental variable.

DIMENSIONS	INDICATORS
Textual	• Proper use of the rules for writing texts. • Identification of the nodes or textual sequences (lexia) in the text. • It is structured considering the way in which ideas and data can be presented on digital media. • It enables the beginning of the reading to be variable, without linearity or predetermined term. • The main text is a coherent communicative statement, bearing a meaning.

	• The linguistic expression contains meaning, that is, its grammatical lexical configuration and its phonological configuration. • The grapheme string (texton) is identified in the text written by the teacher. • It allows the student to construct an uninterrupted sequence made up of one or more textons (escripton) through the chosen textual path. • Proper Associations to human knowledge are considered to determine hyperlinks. • It enables the student to establish analogies and metaphors, lexies with appropriate and effective gaps. • There are reading units in a network of easily navigable paths that allow contextuality and intertextuality. • The bodies of connected texts are identified, although without a primary axis of organization. • The figures of classical rhetoric are identified: synecdoche, asyndeton and metaphor. • Intellectual and discursive operations (textual actions and associated structures) are favored.
Hypermedial	• Hypermedial language structure. • Adequate and intuitive structure of the navigation map. • Presence of navigation and association links from the nodes and anchors present in the text. • Existence of hierarchical relationships, coordination and complementarities between the main text, educational resources, its nodes and anchors. • Relate the linguistic code to non-linguistic codes (images, maps, diagrams, sounds, videos, etc.).
Pedagogical	• The learning objective that is pursued with the construction of the hypertext is defined. • Ideas, data and knowledge that are interconnected are unified. • The structure favors its adaptability based on learning styles: visual, verbal-auditory, global, analytical, planned, spontaneous, cooperative, independent or individual. • Links are selected based on criteria such as: personal relevance, interest, curiosity, experience, information needs or demanded tasks.

	• Facilitates communication between teacher, student and content in a participatory, creative, reflective, expressive and rationalized way. • The usability parameters are recognized: easy to learn, efficient to use, easy to remember, error free and friendly. • Knowledge is represented by explaining the relationship between the nodes through graphic diagrams. • It is identified as a general or specialized reference learning resource. • It makes possible the evaluation of the students from their usability. • The navigation structure facilitates independent learning in the distance study mode. • It is a flexible, structured and learning-focused resource.
Technological	• Use of recognized standards for the cataloging of hypertext as a complex OA. • Publication of the hypertext on online platforms that guarantee its interoperability and durability. • Completion of the fields referring to the use of hypertext according to the standard selected for its classification. • Possibilities of adding or removing nodes and anchors in the hypertext for reuse with another learning objective. • Acknowledgment of the copyright of the hypertext (Creative Commmons License) • It is self-contained and useful in more than one learning activity. • It is easy to identify and therefore easy to search. • It is independent of a specific learning management system. • It is accessible from a wide variety of technology platforms. • It can be used in any of the technological scenarios recognized by the distance education model.

RESULTS

The first result constitutes an analysis of records of the production and use of digital resources at UNAH. The activity logs of the web applications on some of the servers were analyzed, with the aim of quantifying the level of productivity of the center's own digital resources and the trends in their use; For this, the free

tool Splunk Enterprise (http://www.splunk.org) was used. This tool is used to search, monitor and analyze application data, generated by the machines themselves and accessible through a web interface.

This effective tool captures indexes and correlates the data obtained in real time, storing it all in a repository where you search to generate easily definable charts, alerts and dashboards.

The processed data was extracted from the server logs, where the Virtual Teaching Learning Environments, the server logs of the Digital Library, the Repository of Learning Objects and the Educational Social Network (UNETE) are housed. More than 175,400 records were processed, generated during four months of operation of these tools, in the period from September 2017 to February 2019 .

In the period analyzed, teachers published 133 digital resources, of which the vast majority are text files 72 (58 %) and only 23 (15.9 %) are hypertexts, data obtained from the analysis of these files. It is important to point out, the difference that exists between the level of use that students make of text files (35.9 %) and hypertexts (6.8 %), a figure that contrasts with the great difference that exists between the productions of both.

The second result was the observation of hypertexts. For this, an observation guide was prepared that integrated the four dimensions declared in the operational definition of the study variable. Twenty-three resources were analyzed, whose structure, responds to a hypertext.

From the textual dimension, it is observed that teachers write correctly the main text and the links with the same format. As for the nodes or lexias, it is

appreciated that sometimes they fail to delimit the essence of the main text and its relationship with other complementary resources that are accessed through the links. Usually the main text links do not contain other related links so navigation is simple.

The main text, in almost all cases, is a coherent and meaningful communicative statement. This responds to the fact that linguistic expression has an adequate grammatical and phonological lexicon configuration. Graphemes chain (Textron) is identified, in the text that the teacher writes.

The structure of the revised hypertexts does not favor the uninterrupted sequence of reading by the student, giving a unique address for navigation and consists of a single ascription, present in the textual path chosen.

Hypermedia reading, does not help the student establish analogies and metaphors, nor lexis, elements of classical rhetoric are identified: synecdoche, asyndeton and metaphor. On the other hand, intellectual and discursive operations are favored.

From the hyper medial dimension, it is appreciated that the structure of the navigation map is not adequate and intuitive, although the navigation and association links appear from the nodes and anchors present in the text. The linearity, with which the link resources are established, does not show the hierarchical, coordination and complementary relationships between the main text, its nodes and anchors.

A recurring element that is appreciated is that the links are mostly established with other texts (linguistic code), not using images, maps, diagrams and sounds, and that is (non-linguistic codes). This could be given, because

most teachers do not have high levels of ICT skills, which allow them to produce audiovisual and hypermedia resources.

An affected dimension is the pedagogical, although in all cases the learning objective is declared within the resource metadata. There is certain dispersion between ideas, data and knowledge and the elements of the pedagogical discourse that demonstrate their interconnection are not identified.

In the observed hypertext structures, the learning styles that are favored are: visual, analytical and independent; lagging behind: verbal-auditory, global, planned, spontaneous and cooperative. However, the latter favor student-centered learning, which is one of the requirements of the distance study modality.

Links, in most cases, are designed based on classification criteria for certain concepts, with the aim of presenting the characteristics or definitions associated with the linking word. In many cases, the teacher in his speech does not offer the freedom for the student to determine, which is the path that best suits his cognitive concerns, being guided by this the mandatory revision of the link associated with the node.

The communication between the teacher, the student and the contents, in the way in which the observed hypertexts are structured, does not promote participation, creativity and reflection. Among the usability parameters, the one that stands out is the friendly one, due to the simplicity of the hypermedia structure. In neither case is made explicit, the relationship between nodes through graphic schemes.

It is practically impossible in the reviewed hypertexts to evaluate the student based on the learning routes, which he uses in correspondence with his learning style. In all, few or no navigation options appear, the hypermedia framework is simple and almost all the links respond to the linguistic code.

Hypertexts are used more as a general reference resource that specialized. The teacher starts as the main text of the guide that he elaborates, in a linear text format for the student and links its content with the basic or complementary bibliography of his subject, usually in text or Power Point format.

The authors of this paper considers that hypertexts today, are on different platforms, not enhance the independent activity of the student in a distance learning mode. They constitute resources that need the orientation of the learning activity by the teacher, leaving little room for self-learning and the adaptability of this medium to the cognitive needs of the students. Transforming this reality is peremptory, in the context of distance education in Cuba.

From the technological dimension, it is appreciated that the Dublin Core is used as a classification standard for learning objects, although there are deficiencies in its use. Among the most important are: synonymy and polysemy. On the other hand, hypertext is classified, but it does not occur in the same way with the learning resources associated with its links, which does not guarantee its interoperability and durability.

The structure used does not favor the addition or deletion of nodes and anchors for reuse with another learning objective. it is not declared in hypertexts , the author's license for its publication, although, from the Creative Commons distance education model , it is declared with the mandatory and

optional fields. To attend to this problem, teachers must be trained in aspects of info technology.

The third result is obtained from the analysis of the Osgood semantic differential attitude scale applied to teachers.

The attitude scale used was aimed at measuring the affective component (acceptance-rejection) of the teachers sampled, towards the object of attitude: hypertext construction for distance education.

Specifically, the selected scale: Osgood's semantic differential, is measured from the situation of the concept of the analyzed attitude object, in a semantic space of evaluative dimensions (Urbán, 1980). For the application of this instrument, the following were taken into account:

1. The selection of the relevant scales or pairs of adjectives, related to the attitude object that was going to be evaluated.

2. The elaboration of the questionnaire.

3. The randomization of the scales and calculation of the values given by the individuals.
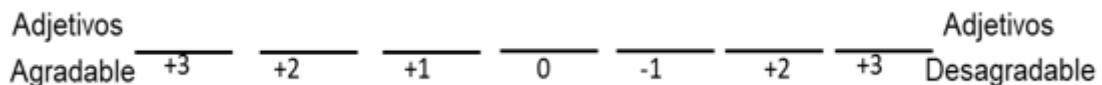
4. The interpretation and discussion of the results.

The attitude objects subject to assessment were the following:

a) Use of hypertexts for the teaching-learning process.

b) Use of hypertexts in distance education.

On the scale, pairs of adjectives are represented by the following numerical system:

The meaning of each is shown in the Table 2

Table 2 - Meaning of each of the indicators on the scale

	MEANING
+3	Very nice
+2	Pretty nice
+1	Something nice
0	Neither pleasant nor unpleasant
-1	Something unpleasant
-2	Pretty nasty

We proceeded to tabulate each of the indicated scales of the two proposed attitude objects that appear in the questionnaire, which made it possible, based on the statistical processing carried out, to determine the factorial qualification of the group and, therefore,

establish partial conclusions in relation to this analysis.

Both objects declared in the questionnaire were valued by teachers as "something adequate", according to the average resulting from the statistical processing of said scales, which means, taking other analyzed elements as a reference, that a large part of teachers shows an attitude of acceptance, rather than rejection, for the use of hypertext both in the teaching-learning process and in the modality of distance study, which corresponds to the highest value given by the teachers' assessment of this object of attitude: (+1.93).

Likewise, the selection of the binomials behaved: adequate-inadequate (+2.55), negative-positive (+1.63), unwanted-desired (+1.58), necessary-unnecessary (+1.95).

This attitude varied slightly with respect to the binomial: essential-expendable, where the resulting value on the scale is characterized as being undefined or neutral (0.03): neither dispensable nor indispensable. (Table 3)

Table 3 - Factorial qualification

Objective pairs	Scale average	Results
adequate- inadecuate	+ 2 , 5 5	Rather adequate
Negative-positive	+ 1 , 6 3	Somewhat positive
imprescindible - prescindible	0 , 0 3	neither imprescindible nor prescindible
undesired- desired	+ 1 , 5 8	Rather desired
necessary - unnecessary	+ 1 , 9 5	Somewhat necessary
Factorial qualification	**+ 1 , 9 3**	**somewhat adequate**

Location on the scale of the result of the sum of the average of each of them:
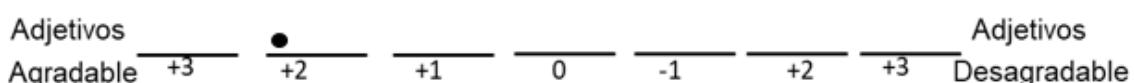
In the object that takes into account the attitude of teachers towards the use of hypertexts in the teaching-learning process (Table 4), the contrast between the binomials is essential: essential-dispensable (+2.08) and effective - ineffective (0.89). The first result shows that, for teachers, hypertexts are quite essential but, in turn, they show indeterminacy regarding their effectiveness.

Table 4 - Factorial qualification

Adjective pairs	Scale average	Results
adequate- inadecuate	+ 1 , 0 5	Somewhat adequate
imprescindible - prescindible	+ 2 , 0 8	Rather imprescindible
necessary - unnecessary	+ 1 , 3 9	Somewhat necessary
basic- complementary	+ 1 , 5 8	Somewhat basic
effective- ineffective	0 , 8 9	neither effective nor ineffective
Factorial qualification	**+ 1 , 0 4**	Rather adequate

Location on the scale of the result of the sum of the average of each of them:
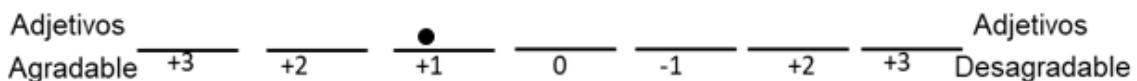
Finally, a semi-structured group interview was applied to four managers of the Technical Sciences faculty who were interviewed and a group of 4 professors who make up the group of experts in distance education of the MES.

As previously indicated, the selection was non-probabilistic, seeking the participation of those who could provide more information, in this case on the possible limitations to the process of producing digital teaching media for the IPAI career in the UNAH.

During the application of this technique, the teachers expressed the following elements of interest:

- *On the technological infrastructure for distance education in the IPAI degree.*

In this sense the respondents said that when the experiment began infrastructure conditions were guaranteed to counting the two Municipal Universities, subject to this experiment, computer labs, wireless connectivity and mobile equipment.

Following the decision of the university, to concentrate on the headquarters to all students in this career, work was guaranteed in the computer lab of the Faculty of Technical Sciences and time schedules machine were organized in the central University laboratories. It should also be noted that a large number of students had computers at home or laptop for their work.

As for the services of the university network, the most used is email, which is guaranteed to all students in the distance modality. However, when evaluating the accesses to the Virtual Classroom, Digital Library and Educational Social Network, an insufficient use of these sites of teaching interest is observed. According to the criteria of the interviewees, this occurs due to the ease that Moodle has in exporting the courses to compressed formats that can be reviewed without the need for connectivity. Hence, the hypertexts found on the mentioned platform can be reviewed.

Regarding Internet connectivity, the university has benefited since 2017 with a speed of 100 MBs; this favors that, in addition to the materials available on the university intranet, students can access information on the Internet.

An element that is contradictory, due to the facilities they have to access international databases with higher levels of connectivity, is the lack of knowledge of the ICT channel of the MES. In Researchers developed (Lombillo, Nambalo , Torres & Pérez, 2018), the authors identify in their diagnosis, the same problem and now in 2020, it continues the unshakable phenomenon.

- *About UNAH policy for the incorporation of ICT in the process of training professionals in the distance study modality.*

In the questions asked on this topic, the teachers generally stated that, despite the treatment in different spaces, such as

the cloisters at the levels of the career, faculty and university groups, it is very difficult to implement the ideas, while these they are not specified in the individual work plans of the teachers and in the teaching and scientific methodological work plans, at all organizational and management levels.

At this point, they also expressed the need for permanent training spaces on the use of ICT in the academic work and in the professional training process, taking into account that the majority of teachers are not native to technologies. It is recognize the work that has been developing Technology Laboratory UNAH in the preparation of teachers, but it is considered that these spaces must be systematic and planned, in line with the priorities that the university has to implement the new distance education model in the careers that are taught.

- *On the use of the ICT tools available on the UNAH intranet for the training of professionals in the distance study modality.*

In this sense, teachers stated that they were aware of the existence of the UNAH repository of learning objects (RUNAH), although in most cases they stated that they did not know how to use it in teaching activities. Likewise, they referred to the use of the Virtual Teaching Learning Environment (EVEA) and the Social Learning Network (UNETE), with respect to the latter; all agree that they are not used for the didactic purposes for which it was implemented. (Pérez, 2018)

Also, they were asked different questions related to the terms hypertext and hypermedia. A large majority expressed almost absolute ignorance about the second of the concepts, despite having heard a lot about the term "hypermedia" in recent times. Some pointed out how much web pages have changed since its inception, when the content was almost completely textual, and how much the role played by the Internet in today's society has influenced this change.

- *About other elements that affect the process of production of digital learning resources at UNAH for distance education.*

The interviewees stated that the fact that they are not regulated, the maximum number of hours of classes that a university professor must teach, nor the time that should be dedicated to the preparation of classes, negatively affects the process of producing resources for digital learning, a task to which they have to dedicate enough time to produce them with quality.

On the other hand, they also point out that these tasks compete with research and postgraduate activities, typical of teachers at this level.

- *General criteria of interest.*

The teachers also pointed out the problem of the continuous movement of the faculty, mainly due to financial problems, noting that a significant number of teachers are young people with less than 10 years of graduation, who have a greater tendency to look for other job offers with better salary advantages, of proximity to their homes, etc.

They also spoke on the subject of the furniture available for work on computers, the lighting and air conditioning conditions of departments and laboratories, on the quality of peripherals (mouse, keyboard and printers).

DISCUSSION

The applied techniques were reinforced with the application of the "Focus Group" and "Force Field Analysis" techniques, thereby achieving the triangulation of the information sources.

The focus group technique is a form of group interview that uses communication between researcher and participants, in order to obtain information on a particular topic. On the other hand, the focus group is a collectivist, rather than an individualist, research method that focuses on the plurality and variety of participants' attitudes, experiences and beliefs, and does so in a relatively short space of time.

For De Urrutia & González (2003), the focus group technique is particularly useful for exploring people's knowledge and experiences in an interaction environment, which allows examining what the person thinks, how he thinks and why he thinks in that way. These authors highlight that an advantage of the application of this technique is that the participants are oriented towards real situations in a space of respect, empathy and group interaction that facilitates openness, spontaneity of expression, even in issues that are difficult to tackle.

On the other hand, the analysis of force fields is a technique developed by Kurt Lewin in the middle of the last century, and whose fundamental premise is that change is the result of the balance between restrictive forces (those that oppose change) and driving forces (those that favor change), the identification of these forces by the team in charge of promoting change is an important element for achieving its objectives.

In the framework of this work, the two techniques mentioned above were applied in a combined way to a group of 27 among UNAH teachers and directors who make up the network of collaborators of the Educational Technology Laboratory and / or participate in the Methodological Work Commission of the Agrarian University of Havana.

In this institution, the current state is characterized by the lack of mechanisms that promote the production of hypermedia, particularly hypertexts, intended for distance education of the IPAI career. In the desired state, hypertexts are produced for the IPAI professional training process, in the remote modality at UNAH.

In this sense, to move from the current state to the desired one, it is proposed as a necessary change the design and application of a methodological strategy for the construction of hypertexts for distance education of the IPAI degree program, which takes advantage and at the same time enhances the possibilities of this resource, for the attention to the individual differences of the students in correspondence with the learning styles that they possess.

Through the combined application of the Focus Group and Force Field Analysis techniques, it was possible to identify the driving forces and the restricting forces of the necessary change, which are listed in Table 5.

Table 5 - Analysis of the force field.

DRIVING FORCES	RESTRICTING FORCES
• MES policy, reflected in RM-MES 110/2018 and in the Strategic Planning to continue the development of	• Teachers do not master hypermedial language. • The hypertexts used in learning activities do not consider the

integrated and progressive teaching systems. • The UNAH's work objectives for the period 2017-2021 are established to computerize the university's processes, which include the training of professionals. • Teachers mostly do an adequate of the writing standards. • Most teachers and students identify the links that constitute nodes and anchors present in the hypertext. • Teachers identify the learning objective that is pursued with the use of hypertext in learning activities. • Teachers recognize the need to overcome them for the use of hypertexts. • Existence of the Educational Technology Laboratory at UNAH with experts in distance education and in the development of advanced technologies for education. • Existence on the UNAH intranet of a repository of learning objects, virtual classrooms, digital library and educational social network, with more than 5,000 resources. • The students and professors of the career have the computer equipment and possibilities of browsing the UNAH Intranet and the Internet.	different learning styles that students have. • Teachers navigate the anchors and nodes of a hypertext, but do not have the necessary skills to design the navigation maps during the production of this resource. • Poor knowledge of teachers in the use of computer tools for the construction of hypertexts. • The procedure and standards for cataloging the hypertext and its links for its efficient search, use and reuse are unknown . • Difficulties for teachers in tools and managers to search for digital resources that can be added to anchors and nodes in a hypertext. • Poor teacher skills for hypertext publication on online web platforms. • There is no systematicity in the preparation of career teachers for the use of hypertexts and ICT tools necessary in the implementation of the distance education model. • The linear structure of the texts in the repository does not favor the adaptability and flexibility of the resource to the characteristics of the students.

The Cause-Effect Diagram allows structuring and hierarchizing the causes that influence a certain problem. This diagram is also known as "Ishikawa fishbone" in honor of its author Ishi kawa (Jrez, s. f.)

The fishbone of Ishikawa can be elaborated in two fundamental ways, the first is to list all the problems identified and then try to rank them, a process that is repeated until it is considered that an atomic level has been reached. The second is to identify the main problems, locate them as primary bones, and then locate secondary causes as smaller bones.

In the framework of this research, this second form was used, however, it should be noted that this technique was also combined with the Focus Group technique, through which the problems faced by the hypertext construction process could be identified, and the possible causes that originate them. In this sense, they are assumed as learning objects, for which the life cycle of these has been considered: design, use and reuse, to identify the problems that affect the adequate construction of hypertexts.

Among the main problems that threaten the hypertext construction process, teacher training and the low standardization of digital resources (an element that negatively influences their reuse), among others represented in Figure 1, stand out.
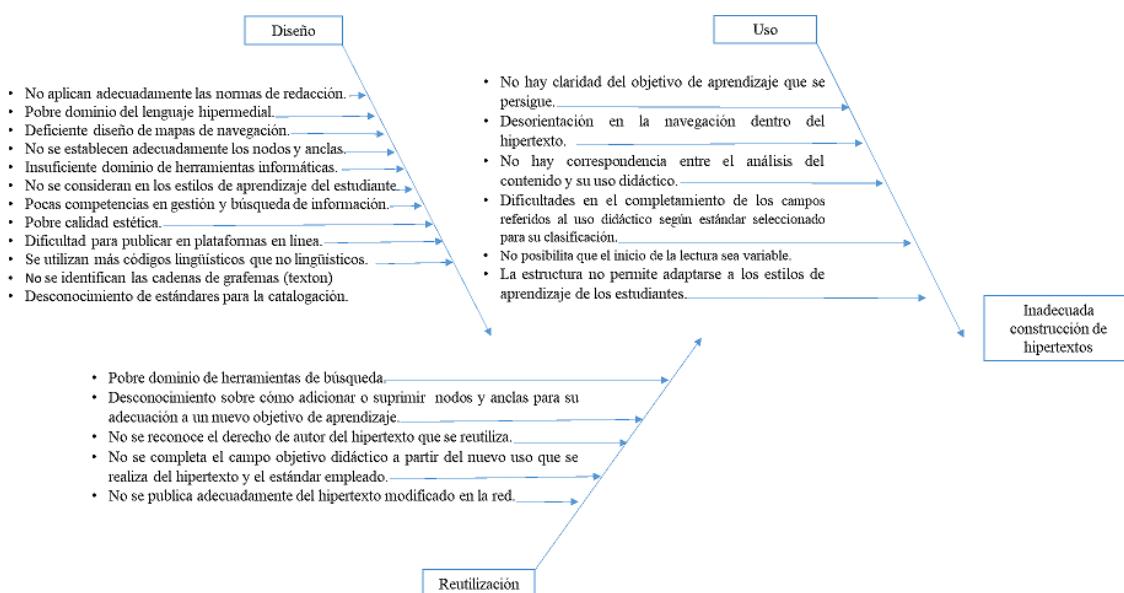
Fig. 1 - Cause-Effect Diagram

The productivity of digital learning resources is considered to be their own, it is a critical point for the successful incorporation of ICT in the training processes of the Agrarian University of Havana, which derives from a set of causes, the solution of which is not limited only to the improvement of the material infrastructure, but, and above all, to aspects related to the improvement and the methodological teaching work of the teacher. Referring to the latter, to the implementation of methodologies and models that are integrated to guarantee the execution of the production-use-reuse cycle.

After the application of a group of methods and techniques for scientific

research and the triangulation of these sources of information, it is evident that there is recognition on the part of the professors and managers of the IPAI degree, regarding the need for the employment of hypertexts as a hyper medial resource that enhances student-centered learning and, consequently, the need to develop technological skills and abilities for its construction.

The diagnosis made threw as main difficulties the following: the insufficient preparation of teachers, the poor command of the language hypermedia, inadequate educational use of hypertext, poor designs navigation maps that are not structured on the basis of the lexies and textons, as well as difficulties in the process

of classifying hypertext as learning objects. All this leads to the establishment in UNAH of a set of actions aimed at preparing teachers for the IPAI degree program in technological methods and tools to creatively incorporate hypertexts as part of the resources that are available to the public today. Students in the digital content management system available on the institution's intranet.

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Conflict of interest:

Authors declare not to have any conflict of interest.

Authors´ Contribution:

Authors participated in the writting process of this article and in the analysis of documents.