

Construction of an RTD as Didactic Support for Non-Face-To-Face Lessons Due to COVID-19

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As a result of the COVID-19 pandemic, there have been momentous changes in working in all sectors of the economy, including the education sector. The educational institutions where face-to-face lessons are taught overnight were forced to continue with distance classes (virtual and online). It is a reality that most schools and their communities were not prepared to deal with this atypical situation. Therefore, the objective was the development of a digital teaching resource (DTR) as pedagogical support, in online classes, of the Business Finance learning unit that is taught at the Escuela Superior de Cómputo (ESCOM) of the National Polytechnic Institute (IPN). Documentary analysis was carried out based on applied research, and the DTR was later built. This construction obeys the criteria considered for the elaboration of digital didactic resources proposed by the authors consulted, particularly in those required and evaluated by the Polytechnic Unit for Virtual Education (UPEV) of the National Polytechnic Institute (IPN), which focuses specifically on pedagogical, editorial, graphic and technical aspects.

Keywords: teaching-learning process, remote classes due to COVID-19 pandemic, digital teaching resource, criteria for the evaluation of digital teaching resources

INTRODUCTION

The rapid use of information and communication technology (ICT) is increasingly present in all areas of human life; it has become a reality in the classroom, in many cases a reality untapped mainly by obstacles such as inflexible school organizations, lack of culture and digital literacy, or even by a scarce or inadequate teacher training for the implementation of ICT in the classroom (Mirete, 2010).

Currently, as of March 2020, as a result of the COVID-19 pandemic, the changes mentioned above have been accentuated even more. Specifically in the educational field, overnight, the educational institutions in which face-to-face classes are taught were forced to continue with their classes, but now in a non-face-to-face way. It is a fact that most schools and their communities (authorities, teachers, pupils,

administrative and support staff) were not prepared to deal with this atypical situation, which has led to a drastic change in the ways of working and, of course, of carrying out the teaching-learning process.

Within this context, the actors involved were given the task of undertaking the necessary actions that would allow them to provide continuity with the classes, which has undoubtedly represented significant challenges. As far as teachers are concerned, once they started teaching technology-mediated classes, they saw the need to redesign the teaching-learning strategies they had been using. This redesign could contemplate, among many other aspects, the development of digital teaching resources (DTR). Therefore, it was decided to carry out applied research that aimed to build a digital teaching resource (DTR) of the thematic unit II of the Business Finance learning unit to support the teaching-learning process in the non-face-to-face modality.

THEORETICAL & CONTEXTUAL FRAMEWORK

The Teaching-Learning Process

The main aim of educational institutions is to achieve student learning. To achieve this, planned teaching must be promoted, among other aspects, with timely and relevant didactic interventions; that is, intentional teaching. Teaching and learning are closely related activities; according to the most recent educational approaches, learning should be understood as a process of construction of knowledge of reality, which develops in the mind of each person (Oliver, 2007; Ruiz, 2012); while teaching should be conceived as an adjusted and necessary aid to the construction processes carried out by students on the programmed contents (Díaz Barriga and Hernández 2010). As Mentioned by Meneses (2007), "teaching can only be understood in relation to learning; and this reality relates not only to the processes linked to teaching, but also to those linked to learning" (p.32), and it is then that the teaching-learning process becomes relevant, which is conceived as the space of dynamic interaction, where the main protagonist is the student, and the teacher is the facilitator of the learning processes (Abreu, Barrera, Breijo and Bonilla, 2018).

Authors studying the subject agree that the main didactic components of the teaching-learning process are: the teacher, the students, the educational objectives, the contents, the context, the didactic strategy, the evaluation, the evaluation means, materials, and didactic resources (Marqués, 2011; Abreu *et al.*, 2018).

Digital Teaching Resources

Educational resources are necessary for the construction of learning; in this sense, Zapata (2016) argues that each learning requires specific conditions that are determined through planning and evaluation processes; the author emphasizes that "such learning conditions are determined by two elements: educational resources and teaching strategies, and by the interaction of both" (p. 3).

In recent decades, the insertion of ICT in education has made it possible to develop and use digital teaching materials and resources. According to Fernández, Domínguez, and de Armas (2013), digital teaching material is a resource in the digital format used in the teaching-learning process. For the National Polytechnic Institute, a digital teaching resource (DTR) is defined as all educational content presented in digital format, which serves as support and/or pedagogical support to promote learning in its different modalities: schooled (face-to-face), unschooled (open, distance, virtual) and mixed. (UPEV, IPN, 2021).

In short, didactic resources are elements that can contribute to providing students with information, techniques, and motivation that facilitate their learning processes. The effectiveness of these resources will depend to a large extent on how the teacher orients their use within the framework of the didactic strategy they are using (Marquès, 2011).

According to Abud 2005 (cited by Aguilar *et al.*, 2014), in the computer field, there are no specific international standards for the evaluation of educational software, so the author proposes a set of metrics based on the ISO-9126 standard. On the other hand, Cepeda, Gallardo, and Rodríguez (2017) highlight that some recent research seems to highlight the remarkable degree of ignorance that exists about the models and guides for the evaluation of printed and digital materials; In this regard, they state that in order to analyze digital didactic materials, the following dimensions must be considered: technological, design, pedagogical, content and evaluation and monitoring.

Likewise, Fernández, *et al.*, (2013) propose a quality model with ten criteria grouped into standards of didactic quality (didactic documentation; quality of the contents: reflection, criticism, and innovation; interactivity, adaptability; and motivation) and technological quality (format and design, usability, accessibility, reusability, and interoperability).

As far as digital teaching resources are concerned, the IPN through the UPEV is responsible for establishing the quality and evaluation criteria weighing four fundamental aspects: pedagogical, editorial, technical, and graphic; for each of these aspects, the aforementioned author has developed a series of indicators contained in an evaluation guide.

RESULTS (DESCRIPTION OF THE DIGITAL TEACHING RESOURCE)

The structure is made up of different elements respecting the format of an html file with cascading Style Sheets (css), and with sequences programmed in javascript, on a web server using the Django framework on Python.

The DTR has two pages:

- a. a home page
- b. a content page

Home Page

It has a start menu with navigation buttons: welcome, competence unit, methodology, evaluation, contacts, and requirements (Figure 1).

FIGURE 1
DTR HOME PAGE



Source: own elaboration

The previous sections are briefly described below:

- Welcome. In a few lines, students are welcomed, and expectations about the performance of the participating actors (students and teachers) are announced.
- Competence unit. Specifies the purpose of the thematic unit, which is explicit in the synthetic program of the learning unit.

- Methodology. The use and function of the didactic resource are specified. It describes in broad strokes the method to be followed to address the contents, explains how the resource will be used to develop the proposed competencies, and gives the student an overview of what they will find and what is expected of them in terms of their performance.
- Evaluation. The type of activities that will be carried out to evaluate learning is announced.
- Contacts. For questions or comments about the DTR and its content, the institutional emails of the team of teachers who participated in the construction of this resource are provided.
- Requirements. The technical requirements to access and make use of the DTR are specified.

To access the content page, click on the **go to the resource** button located in the center-right (figure 1).

Content Page

To facilitate navigation and consultation, the content page is based on views; it is dynamic in maintaining the link, which allows the content of the topic that is displayed to vary depending on the selected case (i.e., the content is constantly changing); in addition to the contents, there is a menu with the following navigation buttons: glossary, presentations, references and support material (figure 2).

**FIGURE 2
DTR CONTENT PAGE**

The screenshot displays the 'Finanzas Empresariales RDD Unidad 2' content page. At the top, there are logos for IPN and ESCOM. Below the header, a navigation bar includes 'Glosario', 'Presentaciones', 'Referencias', and 'Material de apoyo'. The main content area features a section titled 'Introducción' with the following text:

Las organizaciones son parte modular de nuestras vidas. A través del tiempo se ha buscado la manera de intervenir en las organizaciones para hacerlas más productivas, más rentables y por supuesto, más competitivas. Para lograrlo es necesario, entre otros factores, la generación y utilización de información financiera oportuna y confiable.

Algunas veces te has puesto a pensar o a reflexionar sobre: **¿qué es la información financiera?, ¿cómo se genera?, ¿dónde se puede visualizar? o mejor aún ¿cómo se interpreta y cómo se utiliza en la toma de decisiones empresariales?**

La respuesta a estas y otras interrogantes las encontrarás al ir abordando los temas desarrollados en este recurso didáctico digital (RDD), que pretende apuntalar la comprensión de los contenidos de la unidad temática II de la UA Finanzas Empresariales, que se imparte en la **Escuela Superior de Cómputo (ESCOM)** del **Instituto Politécnico Nacional (IPN)**, y así apoyarte en tu proceso de aprendizaje.

Source: own elaboration

The following are the elements of the content page:

- Introduction. An overview of the structure and organization of the contents is given; some questions are asked to awaken interest in the thematic unit's contents. And at the same time, there is an overview of the value and application of business finance in organizations.
- Contents. In this section, you will find the explanation of each of the topics; Additionally, at the end of some of these, you can see buttons in which, when you click, you can consult or download complementary readings, learning activities, other support resources and links to internet videos (figures 4 and 5).

- Glossary. In this section, when typing an accounting or financial term (included in the DTR), its meaning will be shown to enrich the contents.
 - References. The sources of consultation based on which the contents of the thematic unit were developed are listed.
 - Presentations. A PowerPoint presentation with the contents of the thematic unit is included.
 - Support material. In this section are available some formats, graphic organizers, readings, and learning activities to be developed in the thematic unit.

It is important to note that the content section was developed based on thematic unit II of the synthetic program of the Business Finance learning unit, which is taught at the ESCOM of the IPN. An attempt was made to write the text clearly and simply, with a language like the one used when teaching a class in the classroom (addressing the students).

The content (topics and subtopics) is located on the left side of the DTR; at all times, it remains complete and visible to the user. To consult a topic or subtopic, simply locate it and when you click on it, the respective information and explanation is displayed (Figure 3); immediately afterwards, at the end of the explanation, the student will be able to find complementary readings, support materials, videos on the subject and the learning activity(s) to be developed (figures 4 and 5).

FIGURE 3
EXPLANATION OF THE SELECTED TOPIC OR SUBTOPIC

Finanzas Empresariales RDD Unidad 2	Glosario	Presentaciones	Referencias	Material de apoyo
UNIDAD 2				
Introducción				
2.1 La información financiera				
2.2 Las Normas de Información Financiera (NIF)				
2.2.1 Importancia de las Normas de Información Financiera (NIF)				
2.3 Estados Financieros Básicos				
2.3.1 Estado de situación financiera				
2.3.1.1 Estructura del estado de situación financiera				
2.3.1.2 Formas de				

Source: own elaboration

FIGURE 4 READINGS AND SUPPORTING MATERIAL

2.2 Las Normas de Información Financiera (NIF)	En la siguiente lectura se abordan a detalle las principales cuentas que conforman al estado de situación financiera.
2.2.1 Importancia de las Normas de Información Financiera (NIF)	Lectura Principales cuentas del estado de situación financiera, estado de posición financiera o balance general
2.3 Estados Financieros Básicos	A continuación, encontrarás un organizador gráfico, como material de apoyo, que contiene la clasificación de las principales cuentas del estado de situación financiera.
2.3.1 Estado de situación financiera	Material de apoyo Organizador gráfico. Cuentas del estado de situación financiera
2.3.1.1 Estructura del estado de situación financiera	Ya cuentas con los elementos suficientes para realizar las siguientes actividades de aprendizaje:
2.3.1.2 Formas de presentar el estado de situación financiera	
2.3.2 Estado de resultados	

Source: own elaboration

FIGURE 5 EXPLANATORY VIDEOS

2.3 Estados Financieros Básicos	En el siguiente video, encontrarás información complementaria acerca de los estados financieros.
2.3.1 Estado de situación financiera	
2.3.1.1 Estructura del estado de situación financiera	
2.3.1.2 Formas de presentar el estado de situación financiera	
2.3.2 Estado de resultados	
2.3.2.1 Estructura del estado de resultados	
2.3.2.2 Cuentas del estado de resultados	
Cierre de la unidad temática	



Fuente: <https://www.youtube.com/watch?v=CR8miLg0Slg&t=4s>

Source: own elaboration

As far as learning activities are concerned, it is essential to note that some are designed to carry out a formative assessment and others for the summative evaluation. As for its structure, each activity has several activities; title; data (student name, date, and group); the specification of whether or not it has value in the evaluation; detailed instructions, and, if applicable, the evaluation criteria are set out (Figures 6 and 7).

It is worth mentioning that an attempt was made to design contextualized learning activities of interest to students; some represent a challenge in leading students to put into practice and articulate, in real-life situations, what they have learned, thereby promoting meaningful learning.

FIGURE 6
LEARNING ACTIVITY WORTHLESS FOR ASSESSMENT

FINANZAS EMPRESARIALES

ACTIVIDAD: 2.3 Clasificación de las cuentas del estado de situación financiera

DATOS

Nombre: _____

Fecha: _____

Grupo: _____

Valor en la evaluación:
Evaluación formativa

Instrucciones

- Lee cuidadosamente y en cada caso realiza lo que se solicita
- Guarda tu documento con la siguiente nomenclatura:
apellidonombre_Act2.3
- Sube tu actividad en el espacio designado para ello en la plataforma indicada por tu profesor(a)

De la siguiente lista de cuentas (partidas) de activo, pasivos y capital contable, especifica en cada caso, a qué clasificación corresponden: activo circulante (AC), activo no circulante (ANC), pasivo a corto plazo (PCP), pasivo a largo plazo (PLP) y capital contable (CC).

CUENTA	CLASIFICACIÓN				
	AC	ANC	PCP	PLP	CC
1. Renta pagada por anticipado					
2. Papelería y artículos de escritorio pagados por anticipado					
3. Franquicia					
4. Edificio					
5. Patente					
6. Terreno					
7. Cuentas por pagar a proveedores (24 meses)					
8. Anticipo de clientes					
9. Equipo de cómputo					
10. Seguros y fianzas					

Source: own elaboration

FIGURE 7
LEARNING ACTIVITY WITH VALUE FOR ASSESSMENT

FINANZAS EMPRESARIALES

ACTIVIDAD: 2.8 Estado de situación financiera
"El Trébol"

DATOS

Nombre: _____

Fecha: _____

Grupo: _____

Valor en la evaluación:
2 puntos

Instrucciones

- Lee con atención el siguiente ejercicio y resuelve lo que se pide
- Guarda tu documento con la siguiente nomenclatura: apellido_nombre_Act2.8
- Sube tu actividad en el espacio designado para ello en la plataforma indicada por tu profesor(a)

Criterios de evaluación

- Resultados
- Estructura
- Organización
- Entrega oportuna

Source: own elaboration

The function of the DTR developed, regardless of the educational modality in which it is used, is to support and facilitate the teaching-learning process; to promote autonomous learning so that the student knows how to learn, directs, controls, regulates, and evaluates their knowledge. Evaluation is a very complex activity; in this resource, only a small evaluation was included (Figure 8) with multiple choice reagents that appear randomly; at the end of the evaluation, the student will obtain his result and feedback that evidences successes and errors.

FIGURE 8
EVALUATION

2.3.2 Estado de resultados

2.3.2.1 Estructura del estado de resultados

2.3.2.2 Cuentas del estado de resultados

Cierre de la unidad temática

Con el tema antes explicado, has concluido esta unidad temática. Te invitamos a contestar los reactivos de la siguiente evaluación.

Evaluación

Source: own elaboration

The last item of the DTR is the closure of the thematic unit, which can be seen in Figure 9.

FIGURE 9
CLOSURE OF THE THEMATIC UNIT

Finanzas Empresariales
RDD Unidad 2

Glosario Presentaciones Referencias Material de apoyo

UNIDAD 2

Introducción
2.1 La información financiera
2.2 Las Normas de Información Financiera (NIF)
 2.2.1 Importancia de las Normas de Información Financiera (NIF)
2.3 Estados Financieros Básicos
 2.3.1 Estado de situación financiera
 2.3.1.1 Estructura del estado de situación

Cierre de la unidad temática

Felicidades! ya concluyó esta unidad temática. Ahora tienes un panorama más claro acerca de qué es la información financiera, de dónde se obtiene, así como los estados financieros en los que se muestra. Adicionalmente, cuentas con conocimientos básicos sobre la construcción de dos de los estados financieros más importantes (estado de situación financiera y estado de resultados); qué normatividad hay al respecto, y sobre todo la relevancia y el impacto que tiene la información financiera en la toma de decisiones empresariales.

Esperamos que este RDD te haya sido de gran utilidad.

¡GRACIAS!!

Source: own elaboration

METHODOLOGY

The methodology followed in the development of this DTR (of Thematic Unit II of the Business Finance Learning Unit) is based on applied research considering the criteria for the elaboration and evaluation of digital teaching resources proposed by the authors consulted, and specifically in those provided by the Polytechnic Unit for Virtual Education UPEV of the IPN (2021). According to this organization, digital teaching resources must have relevant pedagogical, editorial, technical, and graphic design foundations that support the teaching-learning process to raise educational quality. These fundamentals are contained in Figure 10.

FIGURE 10
ASSESSMENTS AND ASPECTS CONTEMPLATED IN THE EVALUATION OF DTRS

Criterios de evaluación			
Pedagógicos	Editoriales	Técnicos	Diseño gráfico
Introducción			
Competencias			
Metodología			
Agenda de actividades	Bibliografía		
Guía del estudiante	Glosario		
Tabla de evaluación	Citas textuales	Agenda de actividades	
Glosario	Políticas de inclusión	Recursos de apoyo	Criterios generales
Recursos de apoyo	Licencia y derechos de autor	Criterios generales	
Contenidos	Criterios generales		
Recursos multimedia			
Actividades y evaluación			
Criterios generales			
25 puntos	25 puntos	25 puntos	25 puntos

Source: <https://www.ipn.mx/assets/files/dev/docs/DII/02GuiaEvaRDD.pdf>

CONCLUSIONS

The COVID-19 pandemic has impacted the way of living, doing, working, and carrying out the teaching-learning process. Within this context, the use of technology has made it possible, in many cases, to continue with classes in a distance modality, offering new and varied possibilities to both teachers and students. One of these possibilities is precisely the construction of digital teaching resources, which are elaborated and used with relevance, and can have great potential by facilitating, strengthening, and enriching the teaching-learning process.

The DTR central theme of this work was built to support the student in his learning process: to be able to access, with an internet connection, the development and explanation of the contents and thus not only favor autonomy but also learn at his own pace.

It should be noted that this DTR was developed in the period May-December 2020; is in the evaluation process by the UPEV of the IPN; meanwhile, in the February-June 2021 semester, it is being piloted in seven ESCOM groups (approximately two hundred and fifty students).

Once the semester is over, it would be interesting to inquire about the perception and assessment of both students and teachers about using this DTR to detect areas of opportunity and, as far as possible, attend to them.

Due to the urgency and to be able to be used by students during the pandemic, the DTR was only developed for a thematic unit II because it is the most extensive of the learning unit and because from the experience of the teachers who instruct the learning unit, we know that it is the thematic unit that is most difficult for students; however, work is underway to scale the DTR and contemplate the five thematic units that make up the learning unit.

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