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The design of digital teaching resources: theoretical criteria for their development and implementation

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Abstract

The purpose of this essay is to develop an argumentative dialogue on theoretical criteria that can be considered for the design and implementation of digital teaching resources. The importance of reflecting on this subject lies in the need to improve online instruction which, due to the pandemic caused by the SARS- CoV2 virus, has imposed upon us the need to transfer face-to-face instruction to e-learning modalities such as online or combined education. E-learning involves new challenges for the design not only of the instruction *per se* but also of the teaching resources that accompany it. Thus, all educational actors are striving to adapt to e-learning. Some seek to transfer their teaching to an online modality without really changing it or reflecting on how some teaching activities cannot be replicated in a digital format. Others reflecting on precisely the opposite: on how their teaching changes once it is mediated by digital resources, mainly the Internet. It is believed that the expansion of didactic alternatives arising from the change from face-to-face educational modality to the e-learning modality requires exploring some theoretical topics that could be considered as a reference framework to support the development and implementation of digital resources, especially for basic education.

Keywords: Digital teaching resources – theoretical criteria.

The digital gap

It has become evident that the first criterion for the design and implementation of digital teaching resources is to consider the possibilities of access to the infrastructure required; that is, the hardware and software that materialize the creation and use of a digital resource. For this reason, it is essential to review the concept of digital gap.

The digital gap is usually defined as "the distance that exists between the people who have access to information and communication technologies and those who do not have it" (Van

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Dijk, 2017: 1). At the beginning, the concept was applied only to the study of physical access, obtaining the hardware and software of digital media and a connection to the Internet. Physical access is correlated to demographic indicators such as income level, education, age, and gender, widely discussed in sociology as social capital.

Later, in 2015, a second level of digital gap appeared in the field of communication and the media: the gap in the use of digital resources. In his theory of resources and appropriation, Van Dijk (2017) synthesizes the problem of digital gaps as follows:

1. Social inequality produces an unequal distribution of resources.
2. An unequal distribution of resources leads to an unequal access to digital technologies.
3. An unequal access to digital technologies also depends on the characteristics of such technologies.
4. Unequal access to digital technologies also means unequal participation in society.
5. Unequal participation in society reinforces inequalities in the distribution of resources.

It might seem self-evident that, due to social and economic diversity, there is a digital gap in access to digital technologies, and that the health emergency we have experienced in the last year has worsened it. So we cannot take for granted that the addressees of the basic level education (families and students) offered by Jalisco's educational system have access to the digital technologies required to receive an education through a virtual modality.

Thus, it might be convenient to have some census data on who (both students and teachers) actually have access to digital technologies, since assuming that the main agents of education have the economic means to receive a virtual education would be an omission that creates uncertainty and stress among parents, many of whom, without a source of income due to the pandemic, cannot ensure their access to the Internet due to its cost.

Although according to statistics most of the population has at least a smartphone screen, connection through it (for example, buying online access or data from a telephone company) is quite expensive and not very practical when working with educational contents.

Likewise, we should take into consideration the fact that, although basic education teachers working in public education are still being paid their salary, the personal investment they have to make to have access to digital technologies, namely a connection to the Internet and enough bandwidth to work with their students, is an extra effort that should be recognized by society.

The circumstances mentioned above should be taken into account in the design of digital educational resources. There is clearly no immediate solution to this problem. However, a strategy to ensure access to digital educational resources would be desirable since until now, in

the haste to move classroom education into virtual environments, digital resources are being designed under the assumption that the agents of education have an ensured access to such resources.[1]

On the other hand, for students who do have access to the Internet, it is imperative to consider what type of digital device they are using, since their affordance[2] implies considering that educational resources could be designed to operate on multiple screens.

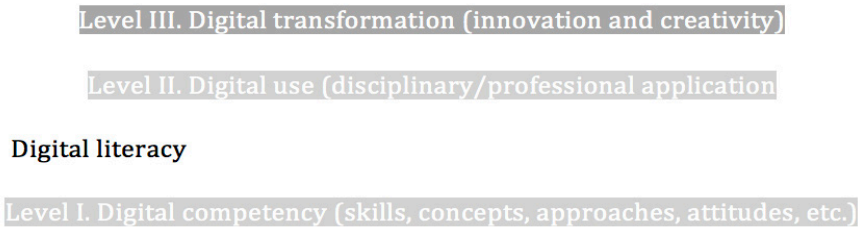
Likewise, it would be pertinent to consider that access to digital competencies, also called digital or media literacy skills, is quite uneven, simply because of the generational gap between students and teachers. Here we should clarify the distinction between instrumental or operative skills and skills related to the contents.

Having instrumental skills (also called skills related to the medium), i.e. being able to operate a medium and navigate the Internet, would seem to be condition enough to ensure access, and according to popular belief this type of skills are predominant in the population. However,

> All contemporary research on digital literacy or skills has found that skills such as retrieving information, communication, and the creation of contents (called skills related to the contents) are in fact more important than the mere use of the media. Having skills related to the medium is only a previous condition to apply skills related to the contents (Van Dijk, 2017: 7).

To reinforce this notion, authors like Martin (2008) speak of levels of digital literacy, which are represented in Figure 1.

Figure 1. Levels of digital literacy



Source: Martin, 2008: 167.

As can be observed, being digitally literate is not quite the same as having digital competency. Therefore, in order for the design of digital didactic resources to be timely, one must take

1 To support this assertion it would suffice to explore the digital resources available in the website of Jalisco's Ministry of Education (Secretaría de Educación del Estado de Jalisco), Recrea Digital (*Cfr.* https://recreadigital.jalisco.gob.mx/#herramientas) and contrast it with the analysis of marginalization in the state, which states that "in Jalisco, […] the differences of access and use of ICTs are present, or at least were very clearly if we take as a reference the years 2010-2015. […] Marginalization is present in all and each one of the municipalities studied" (Arredondo Ramírez, 2017: 162-163).

2 Capacity of an object or environment to perform an action.

into account that operating a digital technology and using it to teach and learn are actually two different realities.

As for the students, calling them "digital natives" (Prensky, 2001) leads one to believe that they are efficient in the use of digital technologies, which may be true if we are talking about Level I of digital literacy or instrumental or operative skills. But this does not necessarily apply to the skills of an individual who is truly digitally literate or possesses the skills related to the contents.

The counter-evidence of the existence of this notion, which points to an almost innate ability of the students to handle a digital technology, is clear: "while some children or young people may feel very confident about their use of technology, their understanding of how technology works and how it may help them to *learn* may be extremely limited" (Coombes, 2009; Kennedy *et al.,* 2009; Singh, Mallan, Giardina, 2008, as cited in Bennet, Maton, 2011, section "Research about Digital Natives").

The same thing happens with teachers. It is possible that many teachers have already developed their instrumental or operative skills, but not the skills related to the use of media contents.

Certainly, a vast majority of teachers are succeding in passing in record time from Level 1 of digital competency to Levels 2 and 3 of digital literacy, i.e. to a disciplinar and creative use of digital resources. An example of this is all the digital resources shared in teachers' social networks.

To close this section, we should only add that the problems imposed on us by the access and use of digital resources (the digital gap) are not going to be solved even in the middle term. However, the current conditions imposed upon the educational system force us to consider short-term strategies, presented below as proposals:

1) An alternative strategy should be considered in the design of digital resources to reduce the inequality in the access gap; that is, we should consider the possibility of using other means at our disposal.
2) In case of not having a gap in the access and having digital resources available, they should be designed in multiple formats so they may be read and used on multiple screens, considering the affordance of each digital medium (PC, digital tablets, or smartphones).
3) The actual implementation of resources requires not only designing them, but also having a parallel training of the agents of education (parents, teachers and students) so they can progress from an instrumental use of the resources (for example, locating a resource in a data base) to the creation of contents. The emergency caused by the pandemic opens up the possibility of overcoming the resistance of the agents of education to use and create resources, as long as there is an adequate accompaniment and

scaffolding with the aim of not only delivering digital resources but also using the so called "collective intelligence" and cooperation among "intelligent crowds" (Rheingold, 2004) to create true practice communities.

4) Likewise, the successful creation of communities capable of organizing and controlling their behavior, in this case the way that common digital resources are being shared, has some distinctive features that are useful for digital training and the design of didactic resources. Sociologist Elinor Ostrom argued that external authorities are not always necessary for the control of resources, what she calls common pool resources. Ostrom (1990) compared different communities, and the most successful groups were those that followed these principles:

   - Group boundaries are clearly defined.
   - The norms that govern the use of collective assets respond well to the needs and conditions of the place.
   - Most of the individuals who follow these norms may participate in their modification.
   - External authorities respect the right of the community members to define their own norms.
   - There is a system to control members' behavior, and the members themselves enforce that control.
   - A graded sanction system is used.
   - Community members have access to inexpensive mechanisms to solve conflicts (Hess, Ostrom, 2007: 7).

Thus, it is possible to trust basic education teachers to create communities in which didactic resources are created and shared, always respecting the autonomy and organization of the learning groups created by the teachers to support their educational work in these times of crisis.

Educational contents

As for the educational contents, we understand the need to provide continuity to the areas of curricular academic, personal and social programs of the basic levels of education. However, since the delivery of these contents has now been forced to involve the use of digital technologies, educational contents and the ways to produce and convey it will necessarily be transformed.

Although it might perhaps seem dated, the technological and pedagogical content knowledge model known as TPACK, (Koehler, Mishra, 2009) clarified how contents and pedagogy are transformed when they interact with technology.[3]

3 By using the TPACK model it is possible to design a didactic activity that, through technological mediation, may be more effective to promote learning.

The TPACK considers first of all that teaching with a technology represents significant challenges for teachers, because the inherent properties of digital resources make it difficult to apply them in a standardized way. It describes these properties as follows:

> Traditional pedagogical technologies, unlike digital technologies, are characterized by their specificity (a pencil is used for writing), stability (the use of a blackboard has remained practically unchanged since its invention), and transparency in their function (the way in which a pencil works is directly linked to its function), while digital technologies are protean (used in different ways), unstable (they change rapidly) and opaque (their working is not visible to their users) (Koehler, Mishra, 2009: 61).

Of these characteristics of digital technologies, the ones that are more likely to upset basic education teachers are their protean and unstable qualities. If digital technologies can be used in myriad ways, and they are also in constant change, the strategy of producing digital contents could take into consideration the fact that such contents will also be used in different ways, and that they will definitely have an expiration date.

For example, static presentations of contents are becoming, thanks to the use of Web 2.0, more interactive. Online software such as Nearpod or Mentimeter allows students to interact with the presentation more dynamically, through questions that must be answered or the introduction of spaces for discussion about the contents themselves.

The presentation of contents through videos or tutorials is also increasingly geared towards interactivity with students or delivered through online programs such as Playposit, which make it possible to create questions, make video clips, insert comments from the students, etc.

With the introduction of interactivity, static educational contents will be created in different ways and will constantly change. Therefore, one cannot expect that contents like these, included in a database, will be used in a standardized way, which does not mean that the learning goal cannot be achieved regardless of the type of contents.

Thus, it seems that we need to take into account the fact that any contents produced will become extremely malleable, so it would be more important not to focus our attention on the curricular contents themselves but on the learning goal that one seeks to achieve with them.

A further consideration, mentioned at the beginning of this section, is that educational contents and pedagogy change when they interact with technology. These changes are precisely what Koehler and Mishra's TPACK model (2009) explains, summarized as follows:

1. *Content Knowledge* (CK): the knowledge teachers have of the subject they are teaching, i.e. facts, theories, concepts, historical perspectives.
2. *Pedagogical Knowledge* (PK): the knowledge teachers have about how they are teaching or how they are going to teach. This includes knowing teaching and learning processes,

practices and methods, educational goals and values, and also implies knowing how students learn, the techniques and methods to be used, as well as learning theories.
3. *Technological Knowledge* (TK): more than just having digital skills, it involves mastering the technology to process information, communicating, and solving problems.

However, although these three types of knowledge are essential when creating activities through digital media, they are not enough. When they interact, these three components are modified, producing new types of knowledge:

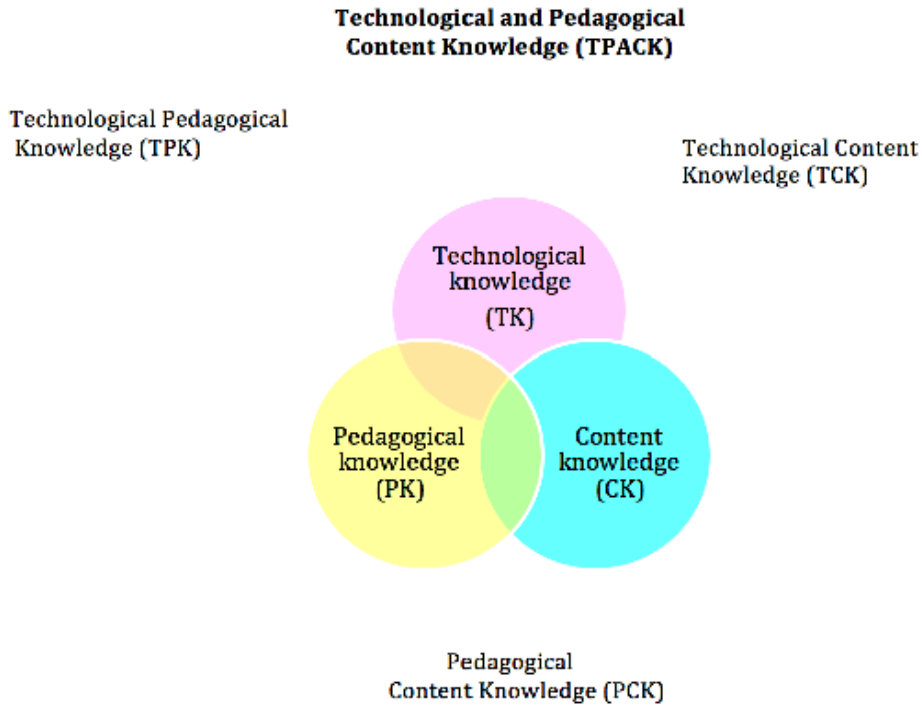
4. *Pedagogical Content Knowledge* (PCK): the transformation that the content undergoes when the teacher interprets the contents and finds multiple ways to represent them. This is the basic core of teaching.
5. *Technological Content Knowledge* (TCK): involves understanding the impact of technologies in the development of the disciplines being taught, since what is known about the contents changes, in part, due to the development of technologies.
6. *Technological Pedagogical Knowledge* (TPK): the knowledge that allows us to understand how teaching can change when a technology is used in a given way. This type of knowledge is very important, especially since digital technologies were not initially created for educational purposes but have been adopted and adapted.

Finally, only if the three types of knowledge (contents, pedagogical, and technological knowledge) and their interactions (pedagogical content knowledge, technological content knowledge and technological pedagogical knowledge) are taken into consideration is it possible to create a TPACK activity, that is, an activity that can be considered the basis of *effective* teaching with technology, since this is how curricular contents are represented through technological media.

Therefore, what really matters for this model is not the technology but the subject to be taught while using the pedagogy to build knowledge. In fact, the first thing one needs to know in a TPACK activity is the contents, followed by the pedagogy, and only then can the technology be included.

What follows is a representation of Koehler and Mishra's TPACK model (2009).

Figure 2. TPACK Model



Source: Koehler & Mishra (2009).

This model also shows that the move from face-to-face education to virtual education is not transparent. That is, the creation of digital resources without curricular and pedagogical knowledge would be of little use to virtual education.

Thus, it would be worthwhile to reflect on the fact that the implementation and creation of digital resources always involve a mobility of pedagogical models when they are mediated by digital technologies.

It would also be a mistake to assume that knowledge and pedagogy have to be "poured" into a digital resource. Rather, the opposite is true: digital education begins when teachers understand that the knowledge to be taught and how it is going to be taught are first, and then – and only then – can we think about the technology or the design of a digital resource.

Therefore, it seems advisable to suggest that the implementation and design of digital resources actually begins by establishing a model that explains the rationale of construction and delivery of education to students in any class mediated by technology.

This shows that when it comes to teaching online technologies are not mere instruments that help to educate. In other words, as Major (2015) points out, technologies are not a support for education but its context. And like any context or "place", the virtual world is where the teaching and learning process occurs.

In an ideal situation, teaching online could be an option for many teachers who have enough digital competencies. However, this is not the case at present. Despite the fact that educational authorities in Mexico have promoted different educational reforms that seek to respond to the social demands derived from the technological revolution, the updating of teachers' technological literacy is still part of the reforms promoted by the Mexican state (Rosales Medrano, 2009).

From this we may infer that the acquisition of technological competencies is a process that has already begun and needs to be continued, especially now that teachers are committed to a large scale change that, additionally, has to be implemented without the adequate infrastructural or temporal resources.[4]

According to Major (2015), some questions that could be considered for the digital training of the agents of education encompass the following areas:

a) Evaluating the technology they have. Teaching online requires adequate technology, and to evaluate this aspect the following questions should be asked:
   • Is there access to a reliable computer?
   • Is there access to high-speed internet?
   • Is there access to sites or tools that support education?

b) Evaluating the institution's support structure:
   • Does the institution provide opportunities for training?
   • Do teachers have support from their colleagues to answer questions about the technology or pedagogy required to teach online?

The last two questions provide support to continue implementing courses for the design and use of digital resources. Evidently, there is no time to pause the progress of the situation and train all the agents of education, but we should at least consider that, at the same time that these agents feel the current demand for evidence of work in digital environments, they also know that they have some support in the shape of relevant training.

A suggestion could be to have the possibility of holding massive online open courses (MOOC´s) or using some already created that offer the incentive of not only acquiring skills, but also have some curricular value for the teachers.

c) Evaluating skills:
   • Do the agents of education have good organizational skills?
   • Do the agents of education have time management skills?

4 This refers to the digital gap both in the possession and use of resources and in the accelerated implementation of online education due to the health emergency caused by the SARS-CoV2 virus.

- Do the teachers have skills to give quick feedback to their students?
- Do the agents of education have skills to write down their thoughts?
- Is there evidence that the terms related to computer technology are well handled and understood?
- Do the agents of education have the skills required to navigate a virtual environment (e.g. typing, handling a file system – create, save, organize files – as well as using a text processor, software for presentations or social networks)?

It would be important to have an updated assessment of these skills in the agents of education, in order to have a starting point to establish the design criteria for the implementation and creation of digital resources.

As we have argued in this section, it seems to be necessary that, besides what has been mentioned in the document, the educational content criteria can consider: a) a model to implement work with digital technologies, and b) an evaluation of the resources required to operate online education.

Understanding the media or resources for teaching

Besides the reflections mentioned above, it may be useful to establish a conceptualization of the media to make decisions on design. According to Romero Tena and Cabero Almenara (2007), there are three perspectives that mark the evolution of the media for teaching:

1) Technical
2) Symbolic system
3) System of variables

The technical perspective is centered only on the informative and communicative aspect of the medium and is characterized by being a material support that trasmits information, so its design will always aim to represent information and will pursue its transmission for educational purposes.

The perspective that sees the medium as a symbolic system revolves around both the symbolic systems used to codify the message and its aesthetic and technical possibilities, so its function, in the best of cases, is to structure the information in such a way that it can be adapted to the intellectual operations that the addressee must perform. Therefore, the design of the media will seek to structure the information in processes similar to those of thought.

Finally, the third perspective, the system of variables, underscores the influence exerted by the environment and how it determines the integration of the medium and the possibilities of interaction with it. Its design will thus consider the characteristics of the context where it

will be used, since the latter will have a significant influence on the outcome achieved with the medium designed.

The following are Romero Tena and Cabero Almenara's (2007: 33) general principles that may be useful to enhance design criteria:

1. The media are only curricular elements that work in interaction with others, and consequently their significance in the teaching and learning process will depend on the decisions adopted about the rest of its components, and the decisions made about them will have repercussions on the rest of the system's components.
2. The instructional, physical, cultural and curricular context are elements that can make it easier or more difficult to know not only how the medium can be used but also whether it should be used.
3. Their utilization requires a previous pedagogical project that endows it with meaning and theoretical cover.

Thus, in accordance to what has been shown about the design of activities mediated by technology (e.g., the TPACK), the criteria for the implementation and design of didactic resources should take into consideration first and foremost the pedagogy, before the technology. It would therefore be useful to explain not only the purposes of the medium and the instructions to use it, but also more concrete pedagogical basis on how to use it in sucj a way that it becomes a real tool for teaching and learning.

Evidently, this means that the individuals who will use a digital medium must know not only how it is used but also its common pedagogical or instructional basis. If this pedagogical consideration is already difficult for professionals (teachers and administrators) it will be even harder for students and parents, so we will have to be very careful and clear in the design of the digital training of these agents.

As for the common pedagogical basis, it would be desirable to include in the design the type of activities and the time that the student will spend interacting with them.

Conole (2013) classifies the activities included in the digital instruction as follows:

1) Assimilation activities (reading, listening, watching; e.g., reading information on a website, listening to a podcast, or watching a Youtube video).
2) Information manipulation activities (e.g., using statistical analysis software such as SPSS or Excel).
3) Communication and productive activities (creating an artifact; e.g., a multimedia presentation).

4) Experiential activities (practicing or imitating a skill, which may be achieved through a strategy video game), and
5) Adaptive activities (modeling or simulating: e.g. using a virtual reality simulator).

Each one of these activities is based on the utilization of different thinking skills.

Since the publication of Bloom's taxonomy and its later revision by Anderson and Krathwohl (2001: 63), it has been recognized that "two of the most important goals of education are to promote retention and to promote transference (which, when it happens, indicates meaningful learning)".

Different cognitive processes are employed to achieve these goals. Closely associated with retention is the cognitive process of remembering, while those processes associated with transference would be understanding, applying, analyzing, evaluating, and creating.

As for the type of activities mentioned, it may be argued that there is a relationship between their typology and the cognitive activity. For instance, assimilation activities (reading, listening and watching) may promote different cognitive processes: not only remembering but also understanding, analyzing and evaluating, so long as the *instructional objective* of the digital resource is to promote not only retention but also transference. For this reason, it would be advisable to add to the design criteria the type of cognitive process that one wants to promote.

Evidently, manipulation, communication, productive, experiential or adaptive activities could promote transference even further, since they involve high order thinking processes (HOTS), unlike mere memory, which only involves the deployment of lower order thinking processes (LOTS) (Churches, 2008).

This is why considering the conceptualization of didactic resources from their symbolic perspective is very important, since the goal is to match the design of the didactic resource with the student's thought processes. This is only a consideration that we suggest adding to the design criteria, as well as selecting an adequate taxonomy of objectives for the digital age[5] that is consistent with the curricular theoretical perspective to be implemented.

E-learning conception and resources

As a final theoretical reflection, we believe it is necessary to understand the type of educational modality that will accompany the implementation and design of digital didactic resources.

A first priority would be to take a theoretical position on the way we understand e-learning, since there seems to be some conceptual confusion between e-learning and the online modality, mobile learning, and the combined modality, among others. E-learning has evolved along with technology, so we can distinguish three stages in its development:

5 Churches' document (2008), *Bloom's Taxonomy Blooms Digitally*, offers ideas on the types of digital resources and the types of thinking skills they promote. Nevertheless, more updated taxonomies could be found.

1) First generation: centered on the creation of materials specifically designed for online education. The model material must be didactic and include elements for reflection, synthesis, activities, etc. Among typical first generation materials are contents in paper formats, digital contents that reproduce books, audio lectures, video lectures and educational software.
2) Second generation: emphasizes the creation of virtual campuses, with a focus on e-learning platforms and managers. In this stage educational models have a less important role or depend on the platforms developed. Among the materials used in the second generation are virtual learning environments like Moodle, Google Classroom or Blackboard, video streaming, online materials, access to internet resources, and interactivity through the use of e-mail and forums.
3) Third generation: online training is oriented to team work, and the student is asked to manage and produce knowledge in collaboration. It is based on the participation made possible by the Web 2.0, through participation and the collective construction of knowledge. The materials used in the third generation are specialized online contents as well as contents generated by students, reflection (e-portfolios, blogs), interactive technologies (games, simulations, online visualization), online learning communities, and mobile learning (m-learning) (Gros, 2011: 15-16).

Each educational institution has reached different stages in this development, depending of course on the educational modality it offers (face-to-face, hybrid or blended, or online). However, a popular characterization of e-learning is, for example, "E-learning is commonly taken to mean the use of internet and computers to learn" (Littlejohn, Pegler, 2007:16).

Therefore, with this in mind, it is almost impossible not to use the affordance and possibilities offered by digital technologies (Herrington, Reeves, Oliver, 2010), especially considering their ubiquity[6] in most everyday activities. An example of this idea would be that, according to the National Survey on the Availability and Use of Information Technologies in Households (ENDUTIH, 2019), in Mexico there are 80.6 million users of the internet and 86.5 million users of cellphones, accounting for 70.01% of the population aged 6 or older. Among the online activities of these users are entertainment (91.5%), obtaining information (90.7%) and communication (90.6) (INEGI, 2020).

This has not gone unnoticed to basic education institutions, which have found ways to integrate the use of digital technology to provide their educational service. However, we should distinguish e-learning from the online teaching modality. The most distinctive aspects of the online modality are perhaps:

6 Ubiquity is understood as the possibility of having access to and processing information anytime and anywhere (Burbules, 2012; Cope, Kalantzis, 2009).

1) Its asynchronicity: both students and teachers do not coincide at a given time to have a class.
2) Its flexibility: the student learns at his/her own rythm, and the instructional design of the classes must be planned so that learning can take place anytime and anywhere.

Therefore, as can be observed, there are differentiating characteristics between e-learning and the virtual learning modality, with the former already being used in the face-to-face modality. We stress this because, due to the health emergency, it has been thought that the migration from the face-to-face modality to the virtual modality virtual somehow implies that "classes" take place within the synchronicity planned for each course and that, for this reason, both students and teachers must be "connected" at the time of the class. This is evidently not instruction in a virtual modality. It may be e-learning, but not virtual teaching.

It is believed that during the health emergency the strategies for the implementation and design of digital resources must respond more to the e-learning modality than to virtual education, for two reasons. The first reason is that most of the programs of basic education institutions (except for the middle high education level) are designed to be offered in a face-to-face fashion.[7] And the second reason is that the migration from face-to-face education to virtual education can only be gradual, which means that implementing it requires a considerable investment of resources such as:

- Technological infrastructure (acquisition of hardware and software to create virtual classrooms as well as digital materials and resources).
- Professional training for teachers.
- Hiring experts in instruccional design (teachers are not, nor do they have to be, instructional designers).
- Hiring experts in educational platform management.
- Hiring advisory services to implement platforms.

Evidently many educational institututions, especially public ones, do not have the time and resources to migrate to virtual education, but there are possibilities to implement e-learning such as it has been defined.

Other institutions will be better preparedas and equipped to migrate to an online modality; however, it will be essential that curricular programs be designed for this modality and that

7 The General Education Law (Ley General de Educación), in Chapter IV, on Educational Processes, mentions the out of school modality, but does not offer any clear guidelines for it. *Cfr*. Diario Oficial de la Federación (2019). This legal document makes clear the dominion of the Mexican State over the contents and operation of the face-to-face curricula of basic education schools, both public and private incorporated to Mexico's Ministry of Education (SEP- Secretaría de Educación Pública).

the teachers who will implement them be fully trained. Therefore, it must be clear that most current educational practices fall more within the description of e-learning and not completely within that of the online modality.

Final thoughts

So far we have addressed theoretical criteria that would have to be taken into account before designing and implementing digital didactic resources.

The topics presented sought to provide a framework of reference to reflect on how to improve online instruction by using different digital didactic resources and, without contemplating all the details of teaching in the e-learning modality, considered key aspects such as the access to and use of resources, the pedagogy that should guide its implementation, as well as the educational modality and type of activities that need to be differentiated in order to understand how to attain better learning outcomes.

As for the digital gap, both of access and of use, it must be recognized that its presence, especially among the agents who study and operate the basic level of education, cannot be overlooked. Those who do not have infrastructural access will not be able to use the resource, and those who do have access but lack the digital literacy skills or have a gap in their use will find it difficult to turn a digital resource into a medium that promotes learning more fully, since it is not by itself didactic.

The didactic component of a digital resource can be achieved when any instructional model that supports teaching is used systematically. Therefore, the TPACK model shows that a resource that aims to deliver a learning content to a student is necessarily modified because it is run through by mediation: on the one hand, the mediation of the technological possibilities of the software and hardware that transform the learning contents, and on the other hand the absence of the direct mediation of a teacher that changes the ways of teaching.

Additionally, we must not only use an instructional model for the creation of digital resources but also recognize that the media do not by themselves promote the formal and meaningful learning needed to apply it in everyday contexts. What gives a didactic value to a medium is the pedagogy that supports it.

Thus, it is also necessary to identify the type of activities that can be included in online instruction and to have a clear idea of how to achieve the goal of transferring learning contents through the use of digital resources.

On the other hand, in order to make teaching meaningful it is useful to recognize the teaching modality one is using, since it is more feasible to understand that if we are using a modality that aims to be virtual the planning of the learning activities becomes extremely important, because it implies that the asynchronic and flexible characteristics of this modality transform the teacher's role from being a transmitter to becoming a learning experien-

ce designer. However, if the modality that will be used is hybrid or synchronic, the use of digital resources allows for a face-to-face presence of the teacher and the students, even if it is mediated by technology (for example, a video lecture), and thus for a more immediate exchange of ideas that may lead to the construction of knowledge shared through direct communicative exchange between teachers and their students and among the students themselves.

Finally, we would have to admit that the urgency caused by the health emergency with which the agents of basic education are designing and implementing digital resources to accompany their e-learning modality will leave traces in the way students are being educated.

We are now learning to accept that the roles of both teachers and students are changing. The former must learn to step out of their role as owners and transmitters of knowledge to become true mediators and designers of learning experiences, and the latter must stop being passive receptors to become more autonomous and responsible students.

Finally, these transformations resemble the ideals pursued both by virtual education and traditional classroom education, regardless of the current health crisis.

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