



Teaching Digital Competence in the Instructional Design of a Dialogic Learning Environment

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Abstract

Teaching digital competence is about the efficient and effective use of digital tools for the elaboration of optimal learning environments. Digital competence is, not only the mastery of devices and applications, but also the consideration of a responsible use of information and communication technologies with a proper instructional design.

This study emphasizes a dialogical teaching and learning approach where students harness the opportunities of digital technologies in their interactions with other students or members of the learning community, based on equity. Success of an educational action depends on the combination of a large number of factors that must be carefully planned and designed in advance. This work presents the design considerations derived from a dialogic teaching and learning approach supported with digital competences to boost community interaction by the creation of enriched dialogue environments. The goal is to build meaningful interactions in the classroom to achieve optimal educational results.

Keywords: Teaching Digital competence; Dialogic learning; Learning design; ICT

Abbreviations: ICT: Information and communication technologies; TDC: Teaching digital competence; DTL: Dialogic teaching and learning; LD: Learning design

Introduction

The complexity of a teaching process has been an object of study throughout history. With the emergence of learning theories, we seek, based on a knowledge construction model, to be able to make decisions that improve education. Either way, this is a delicate process that requires prior preparation or design. Instructional design includes all the elements of the educational action to generate the most appropriate educational product. This essay

reflects on the design characteristics that derive from a dialogic learning approach.

The aim is to surpass previous learning theories by focusing attention on establishing communicative interactions on an equal level. Through the consideration of the critical stages of techno-pedagogical design, the fundamental design elements are extracted to tailor a proper dialogic experience. The key pedagogical elements

considered in this work relate to a dialogical learning and teaching approach (DLT) assisted with digital tools. As stressed in Figure 1, the use of ICTs requires a careful design of the learning design

process where the teaching digital competence of the instructor shall balance the opportunities and the threats to accomplish the dialogic interactions.

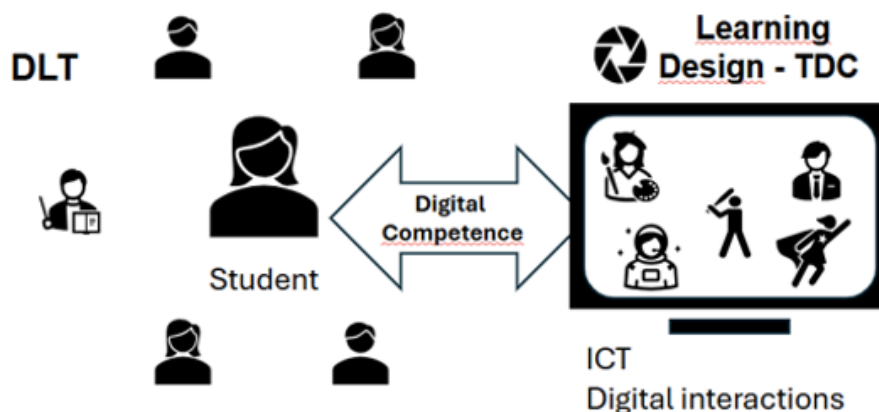


Figure 1: Diagram of Dialogic Learning and Teaching supported with ICTs. Learning design considerations of the digital resources may promote nurturing learning environments.

Therefore, the instructional design arises as a key process to optimize performance. In the educational act, in which content is sought to be transmitted, a large number of variables converge such as educational currents, learning contexts and many other factors.

Different educational approaches have been proposed from the appearance of the first behavioral theories until today in the search for the improvement of learning systems. These currents offer a focus or point of view within which educational activities are oriented.

Within each educational stream you can find a great variety of elements, such as context, type of students, type of teaching among others and also a great variety of resources and materials.

Ultimately, we seek to guide all the aforementioned factors to achieve the transmission of teachings and in some way, foster the construction of knowledge in the student. This objective is where techno-pedagogical design emerges as a fundamental tool to fit all the pieces of the puzzle together. Learning design (LD) according to the authors MOR & Craft [1] consists of “conceiving novel practices, planning activities, resources and tools with the aim of achieving educational achievements in a given situation.”

The first steps towards instructional design (ID) can be traced back to Dewey (1916) and later in the Second World War. Afterwards, in the 50s and 60s, with the contributions of Skinner, it was adapted to the decomposition of the learning process into simple steps for the development of learning itineraries. We see the beginning of ID linked to behaviorist currents, but it has evolved with learning theories. For example, cognitive psychology is considered the learning approach that has been most influenced by instructional design [2].

In subsequent years, ideas such as the criterial approach or Gagne’s learning domains were incorporated. Reaching the 70s with the flourishing of a systems approach.

Finally, as it could not be otherwise, the adaptation to the constructivist current has also impacted the field of design, creating new perspectives in which the outputs are less deterministic, as Jonassen [3] points out. Moreover, constructivist-based approaches promote student activation by fostering their involvement in the control of the learning process. Within these perspectives, the tasks or even the whole instruction can be shared and discussed within the whole learning community.

Instructional design is therefore an area of knowledge for the design of educational action. A large number of fields converge in it to provide service to the 5 large areas on which it focuses, covering.

- The student and his/her learning
- The context
- Structure and sequence
- Training strategies
- Technological means
- Process design

Through an appropriate integration of pedagogical and technological concepts, it provides solutions to convey learning to the student. Today, with the advances of ICT, a world of possibilities opens up to improve learning systems [4,5]. Dialogic learning and teaching strongly relies on communicative approaches [6,7] that can be boosted with digital tools and applications. It is necessary for LD to be nourished by current technological advances, which

requires not only the incorporation of tools and applications, but also mastering their use and controlling it so that it is respectful and productive. Digital resources need to be carefully tailored by the instructor to accomplish with the desired purpose. Rich and genuine human interactions shall be achieved preventing the risks associated with the use of ICTs. It is in this field where the teaching digital competence [TDC] plays a key role in order to adapt technology to the needs of the students and increase awareness of the opportunities and threats associated to digital communications in the learning community.

Discussion

Dialogic Learning and teaching

Dialogical learning focuses on social interactions at the core of the learning process, not only those that occur between the student and the teacher, or between students, but any interaction in the social environment is fundamental for learning. In this way, according to Aubert et al. [7], dialogic learning is that which is the product of meaning-creation processes from interactions that are

aimed at achieving better learning.

Knowledge is created through a guiding dialogue, with the objective of achieving the best possible understanding and agreement around an aspect of reality, around the learning content that is taught and about the educational center itself.

Positioning among learning theories

Dialogical learning aims to overcome the existing theories until now, as briefly described in this section. First of all, it is worth mentioning the objectivist theory, which treats the construction of reality as something alien to people, since it conceives reality as something independent. With this approach, the center of the process is found in the teacher who “communicates” what is the reality that must be learned or memorized. The center of the teaching act is in the teacher. We find contributions in this area from Pavlov (classical conditioning), Thorndike (law of effect) or Skinner (operant conditioning) that have given rise in practice to what is known as programmed instruction (Table 1).

Table 1: Comparative theoretical approaches to learning [8].

CONCEPTION	OBJETIVISM	CONSTRUCTIVISM	COMMUNICATIVE
SOCIETY	Industrial society	Industrial society	Information and knowledge society
SOCIOLOGICAL PERSPECTIVE	Structuralist perspective / Systemic	Subjective perspective	Dual communicative perspective
BASIS	Independent reality	Reality = social construction. Depends on meaning and significance attributed by individuals	Reality = human construction. Meaning depends on the interaction
EXAMPLE	A pen is a pen	Something is a pen if I use for writing	Something is a pen because we all agree it is worth for writing
LEARNING	TRADITIONAL LEARNING Through messages	SIGNIFICANT LEARNING Re-lating concepts with individuals' cognitive structure	DIALOGIC LEARNING Through equal interactions with others
KEY ROLE	Teacher	Student	The whole community
FORMATION	FROM THE TEACHER IN: Transmission of knowledge	FROM TEACHER: Knowledge of the learning process, actors, and their way of building meaning	COMMUNITY: Knowledge of the learning processes of individuals and groups based on interaction
CONSEQUENCES	Imposition of a homogeneous culture	Adaptation to diversity. Maintenance or worsening of inequality	Transformation of the context, respect for differences, egalitarian education

Opposed to this first educational theory, we find the constructivist approach. This perspective places the center of learning in the student who constructs his own learning [9]. The main contributions to this educational approach come from authors such as Piaget or Ausubel in an interpretation of constructivism as meaningful learning. One of the criticisms of this approach is that, given that knowledge is built based on previous concepts, the adaptation of the educational process to each student gives rise to an increase in differences and therefore aggravates the educational problems of society.

Dialogical learning seeks to overcome these approaches by putting interactions at the center of the process. The communicative conception of education is located within a dialogic perspective of reality. For the dialogic perspective, reality is neither only

determined by systems nor only created by the actions of people and groups. To understand this approach a little more, Table 1 is shown.

Following the line of Vygotsky's sociocultural theory of development and learning, we find authors with ideas that contribute to dialogic learning [7] such as Bruner (education as a dialogue between the person and culture), Chomsky (Universal Competence of language), Habermas (Capacity of language and action). The center is now in a social dialogue and learning is no longer monopolized by a few. In this way, everyone's contribution is achieved and with it the transformation. One of the great fruits of this approach is that dialogue places everyone on equal terms and thus overcomes inequalities.

Finally, mention that in the communicative conception of dialogic learning certain analogies are kept with other modern currents such as Connectivism [10]. Dialogical learning is conceived for an information society, like the current one, in which authoritarian models in which a few possessed knowledge are no longer supported. With current access to information, there are multiple avenues for learning and the ability to process information and debate becomes important. Connectivism also deemphasizes the process of memorizing content to move on to analysis and selection capabilities, regardless of whether this is found in human nodes or not. In the case of dialogic learning, social interaction is highlighted through dialogue with people to build knowledge.

Implementation of DLT

The communicative implementation of learning requires the establishment of social interactions on an equal base. In contrast to an authoritarian dialogue, a dialogue with a claim to understanding is defended. This type of dialogue is what produces learning and transformation.

According to the developments that have been made in this current, seven principles are established that characterize dialogic learning [8]:

1. **Egalitarian dialogue:** Necessary to produce understanding. The objective is the search for valid arguments that are based on adequate reasoning and not on impositions of any kind.
2. **Cultural intelligence:** The communicative, academic, and practical skills of any subject are expressed in communicative contexts where you find their cultural meaning. This principle recognizes the need for cultural intelligence to promote learning in schools.
3. **Transformation:** It seeks to transform in different areas: the student's level of knowledge, the knowledge tools, the learners themselves and their contexts.
4. **Instrumental dimension:** Recognizing the instrumental dimension of language is exploited for the creation of critical thinking and metacognitive processes. Explaining, arguing, questioning, and asking are forms of language use that stimulate learning.
5. **Creation of meaning:** This principle states that when interactions and dialogues are exposed and guided by the participants, they become a source of personal and social meaning.
6. **Solidarity:** Solidarity is a characteristic that must be included in dialogues for the creation of egalitarian and horizontal relationships. Collaboration helps improve relationships and academic achievement for all students.
7. **Equality in differences:** One of the foundations of dialogic equality is that it includes equality of rights of differences. That is, any student, regardless of their training, should have the same opportunities. Participate in dialogue for collaboration in the construction of knowledge. In this way, a group can achieve together an achievement that none of its members could

achieve individually.

Any techno-pedagogical design approach in the field of dialogic learning must follow these principles. Within the scope of dialogic learning, a series of instruments are provided with the purpose of providing practical tools for its implementation:

1. **Interactive groups:** These are classroom activities carried out by heterogeneous groups. This means that students are mixed regardless of their culture, prior knowledge, or performance. These groups include the participation of external collaborators to increase social interactions.
2. **Tutored library:** The objective of the library is to expand learning spaces and time outside of school hours. Access to the library is enabled so that students can continue developing their interactions.
3. **Dialogical gatherings:** It is about involving society together with the teachers in gatherings. In this way, social participation in educational tasks is encouraged.

Instructional design oriented for dialogic learning communities

This section aims to develop guidelines for the techno-pedagogical design of an educational process within the theory of dialogic learning. It should be taken into account that this work aims to consider design criteria that will derive from the techno-pedagogical implementation of a communicative learning model. This analysis aims to shed some light on the consequences of applying the principles discussed above.

First of all, it is important to think about the pedagogical framework following the quadrants of Coomey and Stephenson [11]. The dialogic positioning places the teacher and student on an equal basis, with their positioning being in the center of the quadrants. This location of the technological process will therefore imply continuous discussion with the students of both the tasks to be carried out and the learning process. With this, the first implication in the techno-pedagogical design is derived, which is the need to provide argumentation and decision mechanisms for both the process and the tasks and activities to be developed.

Once the educational action is framed, we can proceed, following an ADDIE process: Analysis, Design, Development, Implementation and Evaluation [12]:

Analysis: This step within the techno-pedagogical design process of an educational action is based on the analysis of the students, the content, and the environment. In this phase, an analysis of the needs and the time and resources available for educational implementation is also carried out.

The dialogic perspective generically has the following implications in this phase:

- **Promotion of egalitarian interactions:** work in heterogeneous groups, although in the case of classes with a small student body it could be considered working with the entire group together.

- **Environment:** Encourage the entry of external people into the environment. The role of these people is not related to the content, their function is energizing.

The results of the analysis will constitute fundamental information for the organizational environment that acquires even greater complexity as the number of actors in educational action increases.

Design: The design phase aims to develop a program. In principle, this phase is carried out prior to the beginning, however, given that the control will be carried out in a distributed manner between teachers and students, the design phase must contemplate the organization and decision-making mechanisms that will be carried out during implementation. Following an approach such as that proposed by Reigeluth in the Theory of Elaboration [13] we would move from a general vision to particularization focused on themes. In this second part, the emphasis on the design stage would be less since it would be completed later with the student when constructing the learning. Following the instructional framework proposed in [12], an exploratory design architecture could be used, in which a large number of resources and navigation aids are provided. In this case, when the teacher and volunteers take part in the process, the use can be extended to a great diversity of students.

Development: In development, the materials necessary for the educational event are produced, such as videos, activities, resources, and any type of materials. An appropriate resource at this point is learning objects [2]. These will involve basic pieces of content that can be selected and used during the course.

Implementation: Implementation typically includes the process of publishing materials, training teachers, and beginning support for students and teachers. However, a communicative orientation must activate the network of interactions with external personnel. This may involve activating a network of volunteers, family members, alumni, people with interest whose objective will be to diversify and energize interactions. Addressing the learning objects previously developed in a group will pose a great diversity of situations in which decisions will have to be made, work distributed, helping colleagues and even peer evaluations, among other things. The group facilitator will accompany ensuring that the entire process is an equal dialogue.

Evaluate: This can be a combination of formative and summative assessments. It is in the former where the involvement of all actors can generate greater constructive dialogue. Students, external collaborators, and teachers establish an evaluation process in which everyone is on an equal basis and can present their arguments. In this way, the aim is to hold all parties responsible and analyze the learning process.

TIC opportunities in DLC, developing the teaching digital competence

It is important to highlight the possibilities that information and communications technologies have in dialogic learning. In general, the transformative effect they are having on society, in the way we communicate and how we work, is already widely recognized [14].

Digital skills for work and life are at the top of the agenda of many high-level policies such as in the European Framework [15]. Digital competence is related as engagement with digital technologies for learning, at work and for participation in society. But the conception of competence involves a confident use with a critical and responsible attitude. TDC implies awareness of the opportunities brought by ICTs, the optimal use of them and the threats embedded.

Five different areas can be distinguished from the European reference model for Digital competences in life [15]:

- Information and data literacy
- Communication and collaboration
- Digital content creation
- Safety
- Problem solving and critical thinking

In education digital competences are also being introduced to prepare us for an increasingly technological society of the future. In the specific case of the design of an educational action within the communicative framework of dialogic learning, a couple of fundamental elements can be recognized:

1. **Access to information:** The student has access to various sources of information, in addition to those provided by their teacher, to argue their theories and learn in their group. This is why access to multiple sources of information becomes a fundamental tool for the student who uses it to create his or her speech.
2. **Communication:** ICTs provide unprecedented tools to greatly enhance interactions in different forums and with different cultures. Interactions are diversified and it is also possible to increase exposure time and reach. This factor can be fundamental for the development of interactive groups and for involving external collaborators.

In addition to the advantages mentioned above, ICT provides the ability to carry out simulations, multimedia capacity and many other advantages contributing, from all the digital competence areas to the learning process [16]. However, the previous two have been highlighted in this essay as being the most valuable for establishing dialogic learning. Each of them gives us the arguments and the interaction forum respectively.

DLT conveyed with digital technologies requires careful design of interaction activities in order to guarantee rich and genuine interactions in the learning community. Teaching digital competence shall be elaborated to promote empathy in the interactions. Whether by blending face-to-face sessions with digital communication or by settling the critical requirements to achieve genuine interactions.

The critical elements involved in DLT rich interactions are shown in Figure 2. The moderation facet is related to the establishment of rules and cultural elements required to ensure that the message from every member can be properly delivered to the group.

Engagement is the promotion and expression of one's ideas and at the same time respect and empathy with the interlocutor. Finally, the focus is related to the purpose or target of the interactive dialogue, in order to guide the communication towards an agreed

end. Figure shows examples of communication scenarios where not all the critical areas take place at the same time. The instructor may need the proper combination of different tools to achieve the aimed interaction.

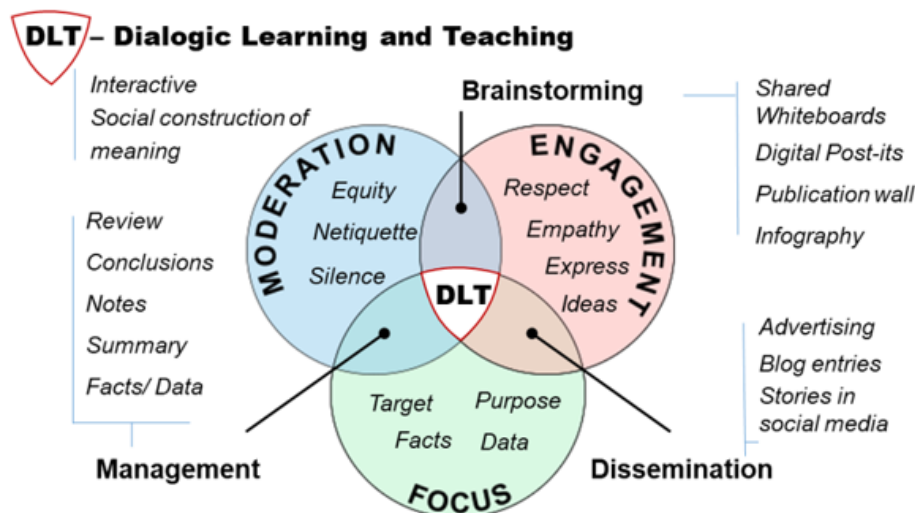


Figure 2: Key dialogic aspect involved in DLT.

The combination of audio or video media with interactive digital applications requires careful instructional design based on the aforementioned considerations. Depending on the purpose and the pedagogical intention, the use of collaborating tools, the size of the interacting group and the use of ice-breaking group dynamics might be orchestrated to achieve the optimum DLT process.

Conclusion

Planning is fundamental in all communicative action, which includes, as it cannot be otherwise, an activity focused on communicative criteria. Digital competency involves the proper use of digital resources aiming enriched interaction in the communicative acknowledging the opportunities of ICTs but also the threats when no critical and responsible use is undertaken.

As we have seen, control of the process and tasks may be shared or discussed within the learning community building a more dialogical approach. However, the creation of rich constructive dialogue must be encouraged in the conception of the activity. In this line, the main actions of the techno-pedagogical design were extracted in each of the phases of the process. Although in the implementation, the students together with the teacher and external collaborators will decide the steps to follow, it is essential that the means of collaboration and dialogue are planned for adequate development. The observance of this aspect in each of the phases of the process, from analysis to evaluation, will contribute to establishing constructive dialogue with which the students, in groups, construct meaning. Dialogic knowledge thus allows us to

achieve levels of excellence that each individual would not have been able to achieve separately, thus achieving the social transformation derived from the communicative approach.

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Conflict of Interest

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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