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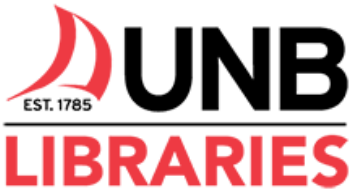

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FROM BEHAVIORISM INSTRUCTIONAL DESIGN TO INSTRUCTIONAL DESIGN IN THE COMPLEXITY OF HIGHER EDUCATION

DEL DISEÑO INSTRUCCIONAL CONDUCTISTA AL DISEÑO INSTRUCCIONAL EN LA COMPLEJIDAD EN EDUCACIÓN SUPERIOR

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Abstract

The instructional design (ID) had a behaviorism function from its origin in the decade of the 60's, however before the formative demands of the present and near future; and with the purpose of innovating teaching-learning practices, we seek to develop a DI from a model centered on the student. Currently, the constructivist model is implemented, which must be rethought towards a model that addresses the complexity where students develop complex thinking skills, problematize reality and achieve their learning in real scenarios with greater autonomy and critical thinking. As part of the problems, there is evidence of lag and dropout at the higher level, graduates face complex and changing work environments where uncertainty is the constant in the exercise of the profession. The degrees do not reach the expected levels and there are still lags that could not be resolved in higher education. The instructional design for the complex must integrate elements of interdisciplinarity, action research and the intervention of the problems in real contexts through a research methodology, a dialectical process of reflection, theory, and practice on the problems faced by students.

Keywords

Instructional design – Complex thinking – Applied research – Higher education – Teaching-learning

Resumen

El diseño instruccional (DI) tuvo una función conductista desde su origen en la década de los 60´s, empero ante las demandas formativas del presente y futuro próximo; y con la finalidad de innovar las prácticas de enseñanza-aprendizaje, se busca desarrollas un DI desde un modelo centrado en el estudiante. Actualmente se implementa el modelo constructivista, el cual debe ser replanteado hacia un modelo que atienda la complejidad donde los estudiantes desarrollen habilidades de pensamiento complejo, problematicen la realidad y logren sus aprendizajes en escenarios reales con mayor autonomía y pensamiento crítico. Como parte de las problemática se muestran evidencias del rezago y deserción escolar en el nivel superior, los egresados enfrentan entornos laborales complejos y cambiantes donde la incertidumbre es la constante en el ejercicio de la

profesión. Las licenciaturas no alcanzan los niveles esperados y aún existen rezagos que no se han podido solventar en educación superior. El diseño instruccional para lo complejo debe integrar elementos de interdisciplinariedad, investigación acción y la intervención de las problemáticas en contextos reales a través de una metodología de investigación, un proceso dialéctico de reflexión, teoría, práctica sobre las problemáticas que enfrentan los estudiantes.

Palabras Claves

Diseño instrucional – Pensamiento complejo – Investigación aplicada – Educación superior
Enseñanza-aprendizaje

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I. Demands from higher education

Higher education faces challenges that show themselves painted by norms of public policy in Mexico, in the Sectorial Education Program 2013-2018[1]. This document mentions that higher education should be geared towards achieving the competencies required for the democratic, social and economic development of the country; affirms that the Federal Government will support institutions of higher education to strengthen academic work and research, as well as to favor the growth of supply in priority areas for regional and national development. In this regard, the universities will be able to increase their contribution to the quality of education in Mexico if they focus their efforts and influence the factors that influence the lag and dropout of the undergraduate students. One of these factors is the way in which academic work is organized, its curricular organization and the implementation of innovative methodologies that respond to the emerging social dynamics and the real problems of society. Regarding the evaluation of learning, the lag is directly attributed to the students who fail, but it does not lead to reflection on the didactic proposal and design of strategies that promote intrinsic motivation and the development of professional competences in students to solution of real problems. The ravages of failure and low school performance is worrisome in our country, some data from the National Association of Universities and Institutions of Higher Education[2] for the period 2017-2018, the following figures are shown:

First Total Income	Total Egress	Men graduated	Women graduated	Total Graduates
1,022,921	605,514	200,443	242,254	442,697

Table 1
Entrance, graduation and higher level qualification data in México (2017-2018)
Source: own elaboration based on data from the ANUIES, 2018

The egress percentage is 59.2% and the terminal efficiency or graduate of 43.3%. Therefore, there is an educational backlog of 56.7%. Even more impressive are the data foreseen for 2017 by the Organization for Economic Cooperation and Development[3]; that show that only 17% of the university-age population (20-29 years) manage to enter to study a career. What falls in an even greater lag because the preliminary figures are derived from this small number of income to Higher Education Institutions (17%).

On the other hand, higher education institutions have redesigned plans and programs of study incorporating the use of information technologies, research skills and critical thinking. Subjects present in the curricular maps on research methodologies, research seminars or research foundations are examples of this. (Educational Program of Bachelor of Education Sciences of the Autonomous University of the State of Hidalgo

[1] Secretaría de Educación Pública, Programa Sectorial de Educación (México: Secretaría de Educación Pública, 2013) http://www.sep.gob.mx/es/sep1/programa_sectorial_de_educacion_13_18#.W_dhTzhKjIU (Consultado en Octubre 2018)

[2] ANUIES, "Anuario estadístico de Educación Superior 2017-2018" Recuperado de http://www.anuies.mx/informacion-y-servicios/informacion-estadistica-de-educacion-superior/anuario-estadistico-de-educacion-superior (Consultado en septiembre 2018)

[3] OCDE, "Panorama de la Educación en México 2013". www.oecd.org/edu/Mexico_EAG2013%20Country%20note%20(ESP).pdf (Consultado en octubre 2018)

(UAEH) However, it is a priority that these approaches are taken as a transversal axis in all subjects for the development of critical and complex thinking and the development of research competence. In this sense, education is considered a pillar that enables changes and transformations and is based on proposals for the transformation of teaching practice as instructional design and complex thinking are considered.

II. The behaviorism origin of instructional design

To begin this section, it is prudent to point out that instructional design has a close relationship with didactics; didactics is conceived as the branch of pedagogy that focuses on the study and teaching methods; then the instructional design as a sequence of programmed activities for teaching, is part of the didactics.

Instructional design is a concept, like many within the educational field, changing and unfinished. Historically, it has been associated with the idea of programmed instruction in the framework of behavioral psychology in education that dominated from 1940 to 1970 and that was placed in the line of educational technology. However, the concept of instructional design has changed over the years and at the end of the 1980s it was proposed as a motivational design for learning and relevant theories for learning[4].

To understand the concept of instructional design it is necessary to first go through the idea of instruction, which historically has been linked more with teaching than with learning[5]; in a resignification of the concept, it is associated more with the intellectual development of the human being, with learning. Bruner[6] proposes four different ways of conceiving learning and therefore instruction, stating that the latter can be receptive, directed, guided or exploratory discovery, these types involve differentiated processes and functions for design actors instructional.

The instructional design can be conceived as a process (since it has its own body of activities and defined purposes where issues related to the design of learning strategies, its relation with objectives and competences, the resources to be implemented, the evaluation, the structuring of contents are addressed, among other); as a phase or stage within macro level educational projects; or as a sequence of activities that the student must follow independently of the educational modality.

Even when a general line of design cannot be established, it coincides with the position of Martínez[7], who recognizes that the instructional or pedagogical design, as the author calls it, is essential in the educational field, since it constitutes the path or guide that every educator must trace to pretend to direct a course, independently of the modality of this one.

This guide has different manifestations or scopes, ranging from a didactic sequence, to a study guide that users will use in a virtual course, for example. Thus, an instructional design must adjust to the caracteristics of its recipients, generate learning

[4] Andrés Chiappe, Diseño instruccional: oficio, fase y proceso (Universidad de la Sábana, 2008),http://educacionyeducadores.unisabana.edu.co/index.php/eye/article/view/742/1718 (Consultado en octubre 2018)

[5] Andrés Chiappe, Diseño instruccional: oficio…

[6] Andrés Chiappe, Diseño instruccional: oficio…

[7] Azucena Martínez, “El diseño instruccional en la educación a distancia. Un acercamiento a los Modelos”, Apertura Vol: 9 num 10 (2009): 104-119.

environments, promote meaningful learning in students, must guide its users in how to learn, be articulated in each of its elements, etc., that is, to be a structure for educational action[8], as well as being integrated by the following elements according to Chiappe[9]:

- Name of subject, topic or topical
- Learning objectives
- Resources needed: estimated times and spaces, Materials, etc.
- Content structuring
- Activities to develop
- Evaluation criteria

One of the current debates about instructional design is the change of the term by pedagogical design or educational design, which still does not reach a consensus[10]. Another debate is around the question of whether there is an evolution or not in the models of instructional design, which will remain a subject of debate on the part of the researchers, subject to the sources or theoretical models that support the instructional designs, the evolution and study of the positions on learning, the evolution of instructional technology, discussions on the quality of education and the impact of information and communication technologies on education, as Luzardo[11] points out.

III. Fundamentals of complex thinking vs. instructional design

Scientific knowledge has been developed in a Western thought that has evolved in the exact sciences and is for the social sciences the simplifying paradigm that universalizes knowledge. In the disciplines of the exact sciences, there is the inseparable bond of the observer and the thing observed to disintegrate it, clarify it, hierarchize and order its elements so that certainties are generated at all costs[12].

Morin poses complex thinking as the need to overcome the one-dimensional vision attached to the principles of simplification and generalization in a closed system; contrary to complex thinking, it works with the diverse, with the uncertain and the random; that is, with the multiple game of interactions.

On Morin's words, complexity is conceived as a fabric of heterogeneous constituents, of actions and interactions in our phenomenal world[13].

Disorder ambiguity and uncertainty are characteristic of complexity, and from an epistemological approach is related to the knowledge of man from an open system where man relates to the environment not only as a simple dependence but the relationship, a link. The system cannot be conceived without the vinculation of men with the exterior and open system.

[8] Azucena Martínez, "El diseño instruccional...104-109.
[9] Andrés Chiappe, Diseño instruccional: oficio…
[10] Andrés Chiappe, Diseño instruccional: oficio…
[11] José Luzardo, "Herramientas Nuevas para los Ajustes Virtuales de la Educación: Análisis de los Modelos de Diseño Instruccional" (Tesis de Doctorado en, Tecana American University, 2004), 49-90.
[12] Edgar Morín, Introducción al pensamiento complejo (España: Gedisa, 1990), 25.
[13] Edgar Morín, Introducción al pensamiento… 32.

The paradigm of complexity is dialectical in the logical field, because it includes the contradiction linked to the transformation of identity. Identity as a living self-organizing system that combines a very large number of units into a whole. Nevertheless, these units are intertwined in a complex and uncertain way, with interferences between the same numbers of units that can be understood as the molecule of a cell. The contradiction is self-organization but it is also related to the random phenomenon. This is beyond our logic because complexity is always related to chance[14] and therefore it is uncertain, it is dialectical because it is linked to a series of order / disorder subject / object, information / organization.

The order is latent in the generalized unit but the disorder is present in the elementary unit and vice versa. We must also accept the imprecision in both phenomena and concepts. The subject / object relationship. The notion of the open system towards the context is opened by the orderly / disordered nature of matter, which have a prominence in disorder (entropy) and in organization (which occurs in the constitution of more complex systems, thus the notion of means environment can be assigned to the environment. In the latter, the subject arises, from self-organization, individuality, complexity, uncertainty, Morin states that when the subject appropriates self-organization carries within itself the subjectivity inherent in the subject[15]. Dialectic of the subject-object. Separable and inseparable, because there is no object without subject and vice versa. The subject creates the object, defines it, delimits, thinks, observes and the environment allows the subject to recognize, think and exist. "Thus the great paradox appears: subject and object are inseparable but our way of thinking excludes one and the other, leaving them alone free to choose between the metaphysical subject and the positivist object"[16].

IV. Articulation: Instructional design and complex thinking

In this section, we will analyze how the method is interwoven as a strategy and the instructional design. The method from the approaches of Morin is a work that has been previously tested to solve uncertainties. Therefore, to reduce the method to the program is to believe that there is a path or the certainty of eliminating uncertainty[17]. It is not important to recognize that there are disagreements between the approaches of instructional design with the method, since the instructional design as a discipline, has its own body of activities in defined purposes that address issues related to the design of learning strategies, their relationship with objectives and competencies, the resources to be implemented, the evaluation and structuring of contents. The instructional design, also called pedagogical or educational, is essential in formal and non-formal formative processes to constitute the path or guide that should be drawn to pretend to direct learning, regardless of the educational modality concerned (face-to-face, distance learning or mixed)[18].

From the role of instructional design in face-to-face and distance education, peculiarities are recognized according to the demands of each of them, for example the

[14] Edgar Morín, Introducción al pensamiento… 60.
[15] Edgar Morín, Introducción al pensamiento… 62-67.
[16] Edgar Morín, Introducción al pensamiento… 67.
[17] Edgar Morín. Educar en la era planetaria: el pensamiento complejo como método de aprendizaje en el error y en la incertidumbre humana. Valladolid: Elaborado para la UNESCO, 2002.
[18] Azucena Martínez, “El diseño instruccional...

self-taught dimension of online work or the evaluation process in a class session in a chemistry laboratory.

In the first modality there is a greater possibility of intervention by the teacher, the processes and training accompaniment can be adapted or adapted by the visibility of situations in the classroom and direct coexistence with the students; in terms of online education, the options to approach the types and forms of learning of the students are limited, despite the advantages of asynchronous learning, the technological possibilities that can be used and allow the breaking of barriers space and time. In this way, as of the 20th century, the aim is to generate an instructional design that is more effective not only in the face of the diversity of educational modalities, but also of agents and educational spaces.

On the other hand, the method cannot be idealized, since it is a journey that does not start with a method if it is not in search of the method facing uncertainties, complexities to find the clues of the method. In particular: the contradictions are that the method is a process under construction and the instructional design assumes elements and predictable dynamics avoiding uncertainty.

Therefore, it is necessary to find the points of convergence between the method and instructional design without pretending to capture what we understand by order and unidimensionality. What elements and characteristics does the instructional design have? Is there a possibility to articulate the complexity to the design of behaviorism and linear origin? What are the possibilities that exist between the design and the method of complexity?

To understand the concept of instructional design it is necessary to first go through the idea of instruction, which historically has been linked more with teaching than with learning, however, in a re signification of the concept, instructional design seeks to associate with intellectual development of the human being, that is to say, learning, privileging a focus centered on the student rather than on the teacher[19].

According to Consuelo Belloch[20], the instructional has been seen from different models that can be based and plan with respect to the assumed learning theory, from here it identifies four generations, realizing the evolution:

- 1960 (first generation). The models have their foundation in behaviorism, they are linear, systematic and prescriptive; focus on academic knowledge and skills and observable and measurable learning objectives.
- 1970 (second generation) These models are based on systems theory, are organized in open systems and unlike the first-generation designs seek greater participation of students.
- 1980 (third generation). Based on cognitive theory, you are concerned about the understanding of learning processes, focusing on cognitive processes: thinking, problem solving, language, concept formation and information processing.
- 1990 (fourth generation). It is based on constructivist and systems theories. Constructivist learning emphasizes the essentially active role of who learns, so that

[19] Andrés Chiappe, Diseño instruccional: oficio…

[20] Consuelo Belloch, Diseño instruccional. Unidad de tecnología educativa (España: Universidad de Valencia, 2013), 59. https://www.uv.es/~bellochc/pedagogia/EVA4.pdf

training actions should be focused on the learning process, on the creativity of the student and not on the specific contents.

To José Luzardo[21] the instructional design, in addition to evolving from the theories of learning, has also done based on educational approaches and the promotion of technologies. We can analyze that since the 1960s the instructional design has gone through an approach focused on observable behaviors to give importance to models centered on the student and their cognitive processes based on the learning needs and characteristics of the students.

Based on the above, the instructional field is considered as the study and understanding of learning processes and the design of instructional strategies to favor it, seeking the congruences between educational purposes and purposes with the competences to be developed, the particular characteristics of the students, and the pedagogical aspects that intervenes in the interaction of students when designing and organizing learning experiences in diverse educational environments.

In terms of its origin, the curriculum and instructional design are historically intertwined with the emergence of pedagogy and the education sciences, so its approach is not independent; Their study as disciplines dates from the beginning of the 20th century, that is, even though these disciplines are currently more clearly differentiated by their purposes, methodologies and theories, they initially share a common origin within the study of educational processes. Besides that, the instructional design (meso and micro process) is conceived as a derivation of the curricular design (macro process).

In the same way, the advances in the theories of learning and the different educational currents have influenced and determined historically, so that their development has similar features, although their area of study and purpose within education and specific processes makes them different each.

There is also a tendency that relates innovation and instructional design, understanding the first as the introduction of something new in an existing context or structure with the purpose of improvement. It implies a process of change driven by the planning and implementation of strategies based on the analysis of the real and inclusive situation of various entities involved, a change that must be permanent.

This coincides with the approaches of Ríos, cited by Ríos and Reinoso[22], who points out that although innovation is a polysemic term, the different meanings agree that it must be deliberate, planned, specified and evaluated after enough time in relation to its pedagogical and social objectives, in addition to contributing something different or new in the context in which it is applied, characteristics that as observed are integrated in most cases in the assumed definition of instructional design.

[21] José Luzardo, “Herramientas Nuevas para… 49-90.

[22] Daniel Ríos y Joselyn Reinoso,Proyectos de innovación educativa. Texto de apoyo didáctico para la formación del alumno, colección módulos pedagógicos (Chile: Universidad de Santiago de Chile, 2008). https://www.researchgate.net/publication/316969247_Innovacion_educativa_en_los_centros_de_ensenanza_Educational_innovation_in_the_centers_of_education (Consultado en octubre 2018)

Once addressed the curriculum and instructional design as disciplines, it can be recognized that they are part of the educational field that is characterized by being interdisciplinary, requiring the intervention of various areas of knowledge from their approaches, tools, theories and methods They provide elements for a more complete and consistent analysis of educational problems in general and of the curriculum and instruction in particular[23].

By this, curricular and instructional design, development and evaluation are interdisciplinary fields that focus on responding to educational problems centered on the design, operation and evaluation of projects, strategies, methods and resources to promote learning and teaching in various educational contexts, school and social, particularly in the current era dominated by technological innovations, in which different disciplines converge.

The curriculum and the structure of instruction must be integrated to respond to the demands and questions that various socio-educational sectors are currently raising, without neglecting other disciplines that share the complexity of educational processes such as: pedagogy, psychology, administration, among others.

We have reviewed the referents of instructional design and complex thinking; we must find the points of agreement between the complexity posed by Morin and the instructional design to visualize them in a practical way. As a premise we can consider in the instructional design horizontal and vertical dynamics in terms of the interaction of its elements. The horizontals are related to interdisciplinarity, collaborative and participatory work, autonomy and self-learning and verticals with institutional guidelines and the prescribed curriculum. For the design, we assume the contemporary constructivist position and that incorporates interdisciplinary fields that focus on answering educational problems centered on the design, operation and evaluation of projects, strategies, methods and resources to favor learning and teaching in various educational contexts, school and social, particularly in the current era dominated by technological innovations, in which different disciplines converge and that subscribe to the field of instructional design and enable complex thinking.

The institutional or normative guidelines are those demands to be fulfilled in the curriculum, the formal part from established contents, methodologies and competences that the students must show and perform, for which we propose to review the contents, the activities to be carried out, tools or necessary resources, and how it articulates these elements with technological tools, of innovation, with a focus on complexity where uncertainty demands for all this flexible processes in the face of uncertainty. In this highly complex scheme, both the teacher and the student. How do they project their transformation?

Conclusions

The instructional design based on complex thinking is an exercise that demands transformations of the teaching practice. Although the instructional design has its behavioral origin, it has moved towards a constructivist model. Both approaches are

[23] Rafael Chacón y Daysi Ramírez, “Propuesta metodológica para el diseño de un curso en línea”. Consultado en octubre 2018. http://www.slideshare.net/rachacorugeles/metodología-para-el-diseo-instruccional (Consultado en octubre 2018)

insufficient to face the social and educational problems of society in constant change. It is required to overcome both paradigms so that students can define problems and work collaboratively from the interdisciplinary and multireferential.

The proposal is the incorporation of tools for students to develop their autonomy and self-learning, necessary to face the uncertainty and emerging scenarios as a dialectical part in their training from theory and practice. For his part, the teacher must emphasize the learning needs of the educational population through which he will model the instructional design; design for chaos, for uncertainty; it means that the method is flexible and unfinished, not an end.

The instructional design must forget the instructions. In this paradigm, didactic tools are a way to generate changes and transformations of reality. They are not the end itself. It is therefore important to point out that the epistemological foundations of complexity are those that will guide the same design, are dialectical, open to chaos and uncertainty to improve their results in relation to the impact on learning to look and solve real problems.

In this way we can reflect in three moments; The first is how to conceive and develop flexible instructional design, which can generate changes and transformations in the teaching practice and the learning of students in uncertain and changing contexts, the second moment, in the design of integrating strategies that promote autonomy and self-learning of who learns, in the third moment, the interdisciplinary approaches in reflections of practical theory for intervention in emerging scenarios, out of all certainty and open to uncertainty.

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