

La exploración en el desarrollo del aprendizaje profundo

The Exploration in the Develop Deep Learning

La exploração no desenvolvimento de la aprendizagem profunda

Jesús Antonio Álvarez Cedillo

Instituto Politécnico Nacional, México

jaalvarez@ipn.mx

<https://orcid.org/0000-0003-0823-4621>

Teodoro Álvarez Sánchez

Instituto Politécnico Nacional, México

talvarez@citedi.mx

<http://orcid.org/0000-0002-2975-7125>

Raúl Junior Sandoval Gómez

Instituto Politécnico Nacional, México

rsandova@ipn.mx

<https://orcid.org/0000-0001-9335-2176>

Mario Aguilar Fernández

Instituto Politécnico Nacional, México

maguilarfer@ipn.mx

<https://orcid.org/0000-0002-7537-4504>

Resumen

El aprendizaje profundo debate el problema del aprendizaje integral y se contrapone al aprendizaje superficial, donde se acepta el conocimiento de forma mecánica, pasiva y donde se almacena información privada. De tal manera que el aprendizaje profundo se enfoca en extraer detalles de la enseñanza activa. La planificación de este método requiere que los estudiantes entiendan el mundo exterior, a través de su propia iniciativa, y propongan un resultado positivo.

Asimismo, el aprendizaje profundo adquiere un significado práctico y habilidoso mediante el vínculo que establece entre el conocimiento existente y el nuevo conocimiento, y ofrece la posibilidad de extender el proceso creativo con la ayuda de la tecnología. Esto potencia, a su vez, la activación y participación de los estudiantes y tomar la experiencia adquirida para aplicarla en diferentes contextos.

Se concluye que el aprendizaje integral permite esbozar una serie de indicaciones respecto al qué, cuándo y cómo explorar y evaluar los conocimientos previos de los alumnos. Esta integración permite aprender de tres a cinco veces más rápido, despertar el interés y se incrementa la motivación para alcanzar un aprendizaje profundo.

Palabras clave: aprendizaje integral, aprendizaje profundo, aprendizaje superficial.

Abstract

Deep learning debates the problem of integral learning as opposed to superficial learning, where knowledge is accepted mechanically, passively and where private information is stored. Thus, deep learning focuses on extracting details from active teaching. The planning of this method requires that students understand the outside world, through their initiative, and propose a positive result or passively accept another proposal that demonstrates the strategy of deep learning.

In addition, deep learning acquires a practical and skillful meaning through the link established between existing knowledge and new knowledge, and offers the possibility of extending the creative process with the help of technology; this will activate students with learned insight and take the acquired experience to apply it in different contexts.

It is concluded that the integral learning allows outlining a series of indications regarding the what, when and how to explore and evaluate the previous knowledge of the students. This integration will enable us to learn three to five times faster, arousing interest and increasing the motivation to achieve deep learning.

Keywords: integral learning, deep learning, surface learning.

Resumo

A aprendizagem profunda debate o problema da aprendizagem integral e se opõe à aprendizagem superficial, em que o conhecimento é aceito mecanicamente, passivamente e onde a informação privada é armazenada. De tal forma que a aprendizagem profunda se concentra em extrair detalhes do ensino ativo. O planejamento desse método exige que os alunos entendam o mundo exterior por iniciativa própria e proponham um resultado positivo.

Além disso, a aprendizagem profunda adquire um significado prático e habilidoso através do vínculo estabelecido entre o conhecimento existente e o novo conhecimento, e oferece a possibilidade de estender o processo criativo com a ajuda da tecnologia. Isso aumenta, por sua vez, a ativação e participação dos alunos e leva a experiência adquirida para aplicá-lo em diferentes contextos.

Conclui-se que a aprendizagem integral permite delinear uma série de indicações sobre o quê, quando e como explorar e avaliar o conhecimento prévio dos alunos. Esta integração permite aprender de três a cinco vezes mais rápido, desperta o interesse e aumenta a motivação para alcançar uma aprendizagem profunda.

Palavras-chave: aprendizagem integral, aprendizagem profunda, aprendizagem de superfície.

Fecha Recepción: Septiembre 2018

Fecha Aceptación: Enero 2019

Introduction

With the exponential development of information technologies, modern science and technology, interdisciplinary cooperation is deepening. And, with this, the demand to improve education at all levels, to increase the learning capacity of students to quickly adapt to academic development and the development of professional talents.

In-depth learning focuses on the promotion of heuristics, research, discussion and participatory teaching with the primary goal of helping students learn to learn.

It was used for the first time by two American academics (Marton and Säljö, 1976), who undertook a study based on reading an academic article and, in the end, asked questions about the text. The results showed that students use two different strategies in learning to read. One strategy is to try to understand the objective of the whole article and understand the context of the content. These are some characteristics of learning that deep learning represents.

There is another strategy that consists of a rather mechanical learning, and represents surface learning or superficial study (Soler, Cárdenas, Hernández and Monroy, 2017). There are also works developed on the theory of learning and depth of learning (Sigüenza, Arsuaga, García and Martínez, 2015).

Technological advances

With the development of information technologies in recent years, several researchers began to analyze deep learning processes using computer tools (Elstad, Christophersen and Turmo, 2012, Romero et al., 2013).

For example, the specialized reading was analyzed in order that the students carried out a quite broad systematization about some conceptions about deep learning through the use of certain tools (Ortega y Hernández, 2015; Ortega, 2017).

As already mentioned, surface learning represents a mechanical form of learning. A student, to complete a task, must passively accept the content of the learning and information. In addition, this type of learning conceives both processes as isolated, that is, they represent unrelated events (Díaz and Pérez, 2013). Precisely in the study by Díaz and Pérez (2013), short-term memory and information are analyzed so that after school students do not forget what they have learned. To do so, these researchers concluded, students need to learn how to conduct an external force, usually through a rating scale, such as passing the exam, or through follow-up activities.

However, according to deep learning, students can learn new ideas and facts critically, and incorporate them into their existing cognitive structure. That is, according to this vision, it is possible to put in contact the numerous ideas and be able to carry out the

migration of existing knowledge to new situations, towards decision making and problem solving, (González, 1997).

It is undoubtedly required that students understand the full meaning of the learning content, including the links between the content and other topics and concepts (Pérez, Díaz, González and Núñez, 2010).

A deep learning strategy must be visualized as a way to incite critical thinking, in order to avoid passive recipients of knowledge, and consists of the integration of information, the needs of students, the history of their own development, the learning outside of school, in time and space after environmental limitations (Báez and Onrubia, 2016).

According to Ademar (2013), talking about human education implies referring to three categories:

1. Learning: students can only repeat words and teachings of the teacher.
2. Curriculum: the education requirements for students who assign them various courses. This type of education is more like "training".
3. Socratism: through a series of questions, dialogue, the various questions, leads to seek a deeper reflection. The idea of looking for bases. In this way, the human mind is fully mobilized (Goldratt y Cox, 1999).

The first two categories mentioned above are part of surface learning; and in the third the true spirit of deep learning is shown. Based on the above, the following research question is asked: Why do students choose the most superficial learning strategy?

With regard to the factors of the surface learning strategy, the following is presented (Hernández y Hervás, 2005):

1. In the teaching process sometimes a clear description of the general teaching objectives is not made. In this structure the teaching program is based on the thematic content that was generated offline, so that students can not understand the knowledge system placed closely around the goal.
2. It does not take into account the previous knowledge of the students: If the study contains a large amount of new information, or requirements within a limited time

to acquire new knowledge, students are forced to face education without exhaustive search .

3. Teaching methods are teacher-centered: Emphasis is placed on the transmission of information, instead of focusing on an in-depth understanding of thought. Teachers who teach by negative means also contribute to superficial learning.
4. Students can not see the intrinsic value of teachers towards the teaching process.
5. The lack of learning feedback processes and methods of mechanical assessment subtly encourages surface learning.
6. It is not conducive for students to resort to surface learning if one wishes to achieve true knowledge.

Innovative education

The American scholar Charles Kirkpatrick wrote in 1941 an article entitled "An Unknown Future and a Doubtful Present: Writing the Victory Plan of 1941", which is considered the foundation stone of innovative education (Kirkpatrick, 2015).

From this fact, the Creative Education Foundation was formally established in the United States, which created many universities and educational and research institutions (Westby and Dawson, 1995). In the 1980s, Japanese Prime Minister Takeo Fukuda personally presided over the meeting of a movement to improve the creativity of the majority of citizens who were preparing for the 21st century.

In this context, traditional teaching methods, from the point of view of educational advocates, are characterized as follows: rigid ideologies, which create passive students and stimulate the use of memory, thanks to which they foster general lack of interest in learning; the pupils simply float on the surface, passively accept indoctrination. In other words, students become robotic beings full of teaching materials (Testa and Paim, 2010).

It is necessary to resort to innovative educational thinking to allow this situation to change. It should be encouraged that education is a creative and innovative manifestation in students, which increases the innovative spirit. Education for all students is the integral formation of an entire process, it is permanent education. At the same time, innovation and

education are a teaching method, reflecting the spirit and purpose of the expression of its core, which provides strong support for deep learning.

Its basic content can be formulated around three levels of innovation (Maldonado y Rodríguez, 2016):

1. Cultivate the spirit of exploration: encourages self-exploration. In this way, the learning process is consolidated in a human being and develops knowledge. Learning to explore allows the global understanding of knowledge between knowledge and contact.

2. Capacity development: Global capacity is the ability to regroup existing knowledge and formulate new ones; unique combination of innovation and new brands.

3. Create awareness and cultivate creative capacity: Create awareness of the psychological motivations that drive individuals to undertake acts of interest and curiosity about knowledge and attitude.

Postmodern education

Postmodernism is a multicultural trend prevalent in the Western world since the 1960s, and is also defended as the modern philosophy of cultural and spiritual value orientation. As well as as a philosophical form of thinking that moderates the attitudes of criticism and construction (García and García, 2013).

Postmodernist educational thinking emphasizes diversity and respect for differences; It allows us to pay attention to equality and to create self-esteem. On the other hand, the learning of a postmodernist concept allows the adoption of educational thinking based on the idea of research, that is, on the knowledge of critical thinking, where the understanding and application of knowledge to solve problems is obtained.

In research it is possible to break the closed state of teaching, where students, located in an open and diverse learning environment, through the exploration and application of knowledge, and with the use of tools, can effectively solve the problem of general knowledge through fragmentation to establish a reasonable knowledge structure (Cobo, 2007).

Planning this learning method requires that students understand the outside world, through their own initiative, and generate a positive outcome after selection, processing and construction; instead of passively accepting what is presented to them, which is precisely the strategy that reflects the depth of learning.

The learning activities allow to extend the creative process; they allow students to activate prior knowledge, use of experience and encourage them to take the initiative, as well as actively build an internal mental representation of the meaningful process.

This learning process includes both a phase of superficial learning (structural knowledge of mastering the process to obtain in this way universal students, based on abstract facts, concepts and principles) as well as a phase of in-depth learning (not only to understand the concept of complexity, but also so that it can be applied in a flexible way, specific situations to solve practical problems).

The arguments discussed in the previous sections allow to outline a series of indications regarding the what, when and how to explore and evaluate the prior knowledge of our students to achieve a deep learning.

In relation to the research question: Why do students choose the most superficial learning strategy? There are two general indications that must be specified according to the level and time of the process in which we carry out the exploration. The object of our inquiry will be the prior knowledge of the students, which are necessary to adopt the learning of the new contents.

Conclusions

Deep learning is an area that needs to be explored. It is barely in a very elementary stage. On the other hand, the indications provided by the constructivist conception greatly amplify the traditional answer to the question of when, that is, when it is convenient to carry out the exploration and evaluation of previous knowledge. In a first approximation, the answer is obvious and simple: whenever it is considered necessary and useful to carry out the teaching work and to help students in their learning.

Acknowledgment

We appreciate the facilities granted for the realization of this work to the National Polytechnic Institute, through the Research and Postgraduate Secretariat with the SIP 2018002 and SIP 20180688 projects. To the Interdisciplinary Unit of Engineering and Social and Administrative Sciences and to the Research Center and Development of Digital Technology. In addition, to the Program to Encourage the Performance of Researchers (EDI) and to the Program of Encouragement to Teaching Performance (EDD).

References

- Ademar, H. (2013). La educación: clave para el desarrollo humano. Una perspectiva desde la educación auténtica. *Análisis*(82), 57-85.
- Báez, J. y Onrubia, J. (2016). Una revisión de tres modelos para enseñar las habilidades de pensamiento en el marco escolar. *Perspectiva Educativa. Formación de Profesores*, 55(5), 94-113.
- Cobo, C. (2007). Modelo de aprendizaje abierto. *Innovación Educativa*, 7(41), 5-17.
- Díaz, A. y Pérez, M. V. (2013). Autoeficacia, enfoque de aprendizaje profundo y estrategias de aprendizaje. *International Journal of Developmental and Educational Psychology*, 2(1), 341-346.
- Elstad, E., Christophersen, K. A. and Turmo, A. (2012). The influence of parents and teachers on the deep learning approach of pupils in norwegian upper-secondary schools. *Electronic Journal of Research in Educational Psychology*, 10(1), 35-56.
- García, J. E. y García, D. L. (2013). Educar en la posmodernidad: hacia una concepción pluralista y política. *Educere: Revista Venezolana de Educación*, (56), 27-32.
- Goldratt, E. M. y Cox, J. (1999). *La meta: Un proceso de mejora continua* (2.a ed.). Estados Unidos: North River Press.
- González, R. (1997). Concepciones y enfoques de aprendizaje. *Revista de Psicodidáctica*, (4), 5-39.
- Hernández, F. y Hervás, R. M. (2005). Enfoques y estilos de aprendizaje en educación superior. *Revista Española de Orientación y Psicopedagogía*, 16(2), 283-299.

- Kirkpatrick, C. E. (2015). An unknown future and a doubtful present: writing the victory plan of 1941. United States: CreateSpace Independent Publishing Platform.
- Maldonado, A. C. y Rodríguez, F. E. (2016). Innovación en los procesos de enseñanza-aprendizaje: Un estudio de casos con la enseñanza justo a tiempo y la instrucción entre pares. *Revista Electrónica Educare*, 20(2), 1-21.
- Marton, F. and Säljö, R. (1976). On qualitative difference in learning. I-Outcome and process. *British Journal of Educational Psychology*, 46, 4-11.
- Ortega, C. y Hernández, A. (2015). Hacia el aprendizaje profundo en la reflexión de la práctica docente. *RA XIMHAI*, 11(4), 213-220.
- Ortega, F. (2017). Principios e implicaciones del Nuevo Modelo Educativo. *Revista Latinoamericana de Estudios Educativos*, 47(1), 43-62.
- Pérez, M. V., Díaz, A., González, J. A. y Núñez, J. C. (2010). Docencia para facilitar el aprendizaje activo y autorregulado. *Revista Diálogo Educativo*, 10(30), 409-424.
- Romero, A., Hidalgo, M. D., González, F., Carrillo, E., Pedraja, M. J., García, J., y Pérez, M. A. (2013). Enfoques de aprendizaje en estudiantes universitarios: comparación de resultados con los cuestionarios ASSIST y R-SPQ-2F. *Revista de Investigación Educativa*, 31(2), 375-391.
- Sigüenza, W., Arsuaga, A., García, O. y Martínez, E. (2015). Enfoques de aprendizaje antes y después del aprendizaje basado en problemas. *Opción*, Año 31(Especial 4), 927-945.
- Soler, M. G., Cárdenas, F. A., Hernández, F. y Monroy, E. (2017). Enfoques de aprendizaje y enfoques de enseñanza: origen y evolución. *Educación y Educadores*, 20(1), 65-88.
- Testa, M. y Paim, J. S. (2010). Memoria e Historia: diálogo entre Mario Testa y Jairnilson Silva Paim. *Salud Colectiva*, 6(2), 211-227.
- Westby, E. L. and Dawson, V. L. (1995). Creativity: Asset or burden in the classroom? *Journal Creativity Research Journal*, 8(1), 1-10.

| <i>Rol de Contribución</i> | <i>Autor (es)</i> |
|---|--|
| Conceptualización | Jesús Antonio Álvarez Cedillo |
| Metodología | Raúl Junior Sandoval Gómez |
| Software | Jesús Antonio Álvarez Cedillo. |
| Validación | Mario Aguilar Fernández. |
| Análisis Formal | Jesús Antonio Álvarez Cedillo ,Teodoro Álvarez Sánchez (IGUAL) |
| Investigación | Jesús Antonio Álvarez Cedillo ,Teodoro Álvarez Sánchez (IGUAL) |
| Recursos | Raúl Junior Sandoval Gómez. |
| Curación de datos | Mario Aguilar Fernández. |
| Escritura - Preparación del borrador original | Jesús Antonio Álvarez Cedillo |
| Escritura - Revisión y edición | Raúl Junior Sandoval Gómez. |
| Visualización | Mario Aguilar Fernández. |
| Supervisión | Jesús Antonio Álvarez Cedillo |
| Administración de Proyectos | Jesús Antonio Álvarez Cedillo |
| Adquisición de fondos | Raúl Junior Sandoval Gómez. |