Inverted Classroom to Develop Self-regulated Learning in University Students in Times of Pandemic

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Abstract

The article presents a literature review on the theories of the flipped classroom as a didactic strategy to develop self-regulated learning in university students a new learning paradigm, where the student regulates his own learning. The connectivity provided by ICTs and especially the internet has brought with it new, unsuspected communication possibilities. These have caused a transformation in the distribution and access to knowledge with effects that we are just beginning to know. Mainly in the educational field, this ease of access gives us the possibility that human beings have the freedom to learn at our own pace from physical spaces without the need to travel to training centers or adjust to fixed schedules, the development of learning Self-regulation from the psychoeducational point of view allows regulating the capacity of the learning construction process itself, thus achieving the competence of learning to learn.

Key-words: Self-regulated Learning, Flipped Classroom, Pandemic, Higher Education.

1. Introduction

The impact on higher education has been both dramatic and transformative; similarly, a common trend in education systems around the world has been to respond to the pandemic with "emergency e-learning" protocols, marking a rapid transition from face-to-face classes to online learning systems. Educational institutions are challenged to adapt to this change, in addition they are trying to choose the right technologies and approaches to educate and engage their students

(Rashid and Stiglitz, 2020). The campus closure and sudden shift from face-to-face education to remote instruction is just a small experiment in providing online education that offers effective tools for student engagement and teacher training.

This can enhance the creation of stronger links between universities, online education companies and technology providers in the aftermath of the pandemic. Universities will need to pay close attention to having educators trained and equipped with digital technology for a smooth teaching-learning process. The government will need to intensify and engage in sustained professional development programs to boost the teaching capabilities of educators. The pandemic has highlighted vulnerabilities and shortcomings of current education systems, it has also emphasized the need to develop digital literacy, particularly, in times like these, for both developed and developing countries (Rashid and Stiglitz, 2020). Increased digitization of educational and communication services may become a post-pandemic norm. The current situation has challenged entrenched notions about the role of higher education institutions in providing quality education, mode of delivery, accessibility, the importance of lifelong learning, and educators' perceptions of the type of learners. This can provide information to educators and policy makers for the overall improvement of education systems worldwide.

Classroom education has been the main bastion of the educational process at a universal level. It is said that classroom education has its beginnings in the nineteenth century when education was no longer a benefit of minorities to be extended to as many sectors as possible. Since then, there have been multiple studies applied to enhance these spaces in order to obtain the best results in the educational process. This has allowed this space to become a welcoming, versatile, functional, stimulating, dynamic place, with the different tools, spaces and resources necessary for teaching, thus guaranteeing the learning of teachers and students. All these studies and applications have allowed the classroom to become an ideal environment, a safe place for the delivery of education to which, in the present year 2020, education professionals have been forced to renounce. The common structure of global face-to-face education has been forcibly altered by a new threat: covid-19, also known as coronavirus. The global pandemic situation forced governments in more than 190 countries to suspend face-to-face activities at all levels, and this has led to distance learning. Self-regulated learning has become a fundamental variable both in studies and in educational practice (Pintrich, 2000; Reynolds and Miller, 2003), since it offers a response to psychoeducational needs that seeks to train individuals capable of adopting considerable autonomy in their training and who develop a series of strategies that allow them to continue learning beyond their academic life; it is necessary to

emphasize that, from basic education, self-regulated learning should be developed so that students reflect on how they are learning and how they can self-regulate their way of acquiring knowledge.

2. George Simons's Theory of Connectivism

Connectivism, formulated by Siemens (2012), is a learning theory for the digital age. It is based on the construction of connections as learning activities. It attempts to explain the effect that technology has had on the way we currently live, communicate, and learn. The starting point of this theory is the individual who gets all his or her information from a network that is continuously fed back; new information renders old information obsolete. The ability to discern between information that is important and information that is trivial is vital, as is the ability to recognize when this new information alters decisions made on the basis of past information. In this sense, this theory converges with the new trends of the digital era, where information flows from multiple points.

One of the terms of necessary definition for the development of this research is connectivism. In the work of Costa-Román, et al. (2019), the authors have stated that the digital era is characterized by a permanent connection of the student to the environment, accessing it comfortably through different virtual networks via the Internet. This has allowed the distance barrier in education to be broken and it has evolved into what is known today as e-learning. Classical models of learning cannot explain this type of learning, since it arises from the learner's own fusion with his or her environment, adopting its lifestyles and attitudes, independently of the specific purpose of learning or the learner's will.

3. Ubiquitous Learning

According to Vásquez and Sevillano (2015), ubiquitous learning presents a new educational paradigm that, in large part, is possible thanks to the new digital media, also the convergence of technologies and the proliferation of new services based on audio and video allow current education to be available at any time, anywhere, in any social media and most importantly, using any device. Therefore, ubiquitous learning is a kind of model that every teacher of these times should know and practice for the benefit of their students' learning, since through it, students have new possibilities to learn without having to be physically seated at a desk, in addition to the advantages provided by mobile technology with which we can access the Internet without the need to have a cable to connect.

Therefore, Gutiérrez (2012), in his research, states that, thanks to technologies, students can work on countless activities at the same time, in addition to maintaining communication with other members; But we must be very careful because technology can also become a huge distractor, so we must establish well-planned activities that help us to create meaningful learning; that is, the student must be the builder of his knowledge, apply what he has learned in his daily life always with the guidance, the orientation of the teacher and, above all, that there is good communication between the two. So ubiquitous learning aims to create a learning environment or generalized or omnipresent educational context, in which a learning environment is created and the student is totally immersed in a ubiquitous learning environment, where he not only acquires knowledge, but also shares it with his peers and his environment, and at the same time, can disseminate it.

Referring then to this meaning in the noun ubiquitous learning, we agree then with the explanation of Fernandez, Bastidas and Lopez (2020) who, in their research, mention it together with other already known disciplines such as E-Learning, B-Learninig and M-Learning, U-Learning (Ubiquitous Learning). The authors indicate that the main characteristic of this type of learning is that it can be carried out anywhere and at any time. One of the fundamental characteristics of this type of education is that it offers adaptation to the personal agendas of each student, allowing them to carry out their studies and assigned activities according to their schedules.

4. Dimensions of Ubiquitous Learning

On the other hand, Burbules (2014) states that ubiquitous learning is linked to three dimensions: a) the dispersed, where the volume of published content has its correlate in the dissemination (sometimes "viral"), the non-hierarchical and fragmentation; b) the ephemeral, where circulation marks an accelerated pace that turns the new into something fast and fleeting; c) the important, which basically refers to the criterion that allows, simultaneously, to focus and/or discard.

5. Conceptualization and Origin of the Inverted Classroom

Inverted classrooms are a teaching-learning proposal, whose methodology consists of altering the order in which a traditional classroom is developed in order to prioritize the construction of knowledge during class time. This model, which is also called Inverted or Flipped Classroom Model (ICM/FCM), Flipped Classroom, Inverted Learning Model, Inverted Instruction Model and Flip-teaching has its bases in the constructivist theory and approach, cooperative learning, active learning,

inverted learning, meaningful learning, experiential learning, blended learning and student-centered learning (Landa, 2017).

The origins of this method took place at Woodland Park High School in Colorado (USA), where two chemistry teachers: Jonathan Bergmann and Aaron Sams, developed and consolidated the concept of flipped classroom, motivated by the fact that some students could not attend classes and, so that they would not be harmed, they recorded the classes and shared them. When they noticed that almost all students used this tool, they decided to make more recordings and share them before classes and, during classroom hours, to put the acquired knowledge into practice. This is how these authors define the virtual classroom as a dynamic and interactive pedagogical approach that goes from a collective learning space to an individual one, in which the teacher plays a guiding role for the students (Landa, 2017; Bergmann and Sams, 2014).

The inverted classroom or flipped classroom teaching method has as its main objective to achieve that, during the learning process, the student assumes a much more active role, which is more meaningful than the one assumed in traditional education. In other words, the student must review by himself the materials, concepts, worksheets, videos or podcasts sent in advance by the teacher and, during class time, doubts can be resolved, content can be discussed, debates, practices and/or evaluations can be opened. Currently, students have developed the ability to use different technologies as learning tools during class hours, also outside of them, which is why these tools should be used, mainly, to facilitate and improve the learning process (Berenguer, 2016).

In some other definitions of inverted classroom, the authors argue that it should not necessarily be limited to the use of technology and that, in order to facilitate learning, teachers must first know the theory and fundamentals of this system, then adapt the different tools and resources they have available to perform the reverse process to the development of a traditional class, verifying that the order and purpose of this methodology is maintained. It is also mentioned that this teaching method is interactive and dynamic, in addition, it allows developing and bringing deeper previous knowledge to the classes; it allows making effective use of class hours always under the guidance of the teacher (Bustamante and Holguin, 2019).

Thus, the reverse classroom model is presented as an alternative that provides the means to solve teaching-learning problems that may arise in a traditional classroom. In addition, it is important to keep pace with the development of technology, new needs and take advantage of the available tools (Bustamante and Holguin, 2019).

6. Pillars of the Flipped Classroom

According to Rosell (2010), four pillars of the flipped classroom can be identified.

Deep, Progressive and much More Meaningful Learning

A higher level of interaction is generated through activities; but these are developed in a free environment, without strict time pressures or peer pressure. The student chooses the moments he/she considers most appropriate. There is no limit to revisions or a review, since the entire class, as well as the information, is recorded.

The Student is the Center of Learning and the Teacher is his Coach in this Process

The teacher accompanies the student since the latter is the active agent of his education (Ausubel, 1978); in other words, the teacher plays the dynamic role that allows the student to be motivated, to be creative and to feel free to ask questions. Additional time is obtained so that the student can develop his activities, tasks and exercises (Fortanet, et al., 2013).

Ordered and Structured Interactive Content

In the technological context, which allows the use of virtual classrooms, it is possible to design their content. Thus, the teacher can prepare the environment, prioritize information, control processes, and schedule times more efficiently. It also allows debate, dialogue and interaction (Álvarez, 2012).

All Technology at the Service of Learning

Technology allows synchronies, shortening difficulties of time and space, thus generating a real digital transformation. This implies not only the acquisition of technology, but also the development of the necessary competencies to incorporate technology into educational practice.

7. Flavell's Model of Metacognition

Metacognition as the understanding that the individual possesses about cognitive processes and products, as well as concurrent issues with them; that is, the ability that people have to manage

and order their own learning processes. Therefore, Flavell (1976) proposed a metacognitive model which took into consideration that metacognitive skills are subordinated to the activities and interactions within the cognitive purposes that are tasks, metacognitive experiences, cognitive/ metacognitive strategies and metacognitive knowledge. In addition, he stated that metacognition is a procedure that requires monitoring and ordering of inquiry in order to achieve a particular purpose (Flavell, 1976). Similarly, Flavell (1979) pointed out that this metacognitive procedure could be stimulated, responsibly and unwisely through various observable characteristics that intervene in the development of cognitive organization. According to this author, there was a reciprocal interchange in each of the cognitive and metacognitive elements and he implied that there seemed to be an evident inquiry between metacognitive discernment, metacognitive experiences and cognitive behavior. Metacognitive experiences are cognitive or affective experiences that drive cognitive work and have been defined as ideas, thoughts, sensations or feelings involved with moving towards goals that are consciously interpreted (Larraz, 2015).

8. Self-regulation of Learning

In the words of Hernandez and Camargo (2017), it can be noted that self-regulation used in learning gains preponderance in education from the 1980s with the definition addressed by Zimmerman (1989), which states that students who self-regulate their learning are shown as directors at the time of acquiring new knowledge and in the optimization of their capabilities; in addition, they use specific strategies and aimed at self-efficacy in order to consolidate the objectives outlined in their academic activities established in their learning processes. This active participation of the students allows, taking as a reference the contributions of Wolters, et al. (2003), that they construct new information and, therefore, meanings after supervising, regularizing and directing their cognitive, motivational and behavioral aspects in front of goals established by themselves, as well as raising, evaluating and modifying goals involved in the achievement of the diverse activities presented to the student in the classroom (González, 2001).

9. Zimmerman's Models of Self-regulation of Learning (1989)

From Zimmerman's (1989) position, there are three general aspects that are interrelated with the purpose of obtaining academic achievement: 1) the personal aspect, 2) the aspect of the environment and 3) the behavioral aspect. Likewise, the author points out that, from this panorama,

three strategies are derived, which are activated by means of feedback and which will influence when the student self-regulates his learning: 1) behavioral self-regulation, which includes self-evaluation to verify the efficient fulfillment of some academic activity; 2) environmental self-regulation, in which the student is the director of his study space and, therefore, organizes it at his convenience; and 3) covert self-regulation, which is related to the effects of metacognitive processes on the student's personal processes and how those form the basis of knowledge, as well as affective states.

From a social and cognitive perspective, as stated by Zimmerman (2000), self-regulation processes and their convictions are divided into three cyclical phases: premeditation, performance or control of the will and self-reflection processes. According to the author mentioned above, the first phase is related to those processes that are considered before performing a certain activity and, therefore, prepare the work scenario; the second phase is executed during the development of the activity and influences attention; the third and last phase considers those procedures that are generated after the activity has been executed and condition the final verdict of the person or, in this case, of the student regarding the development and experience of the activity that he/she has been executing.

10. Self-regulated Learning

The construct of self-regulated learning is related to independent and effective forms of academic learning that involve metacognition, intrinsic motivation and strategic action (Perry, 2002). It is defined as "an active process in which students establish the goals that guide their learning by attempting to monitor, regulate and control their cognition, motivation and behavior with the intention of achieving them" (Rosario, 2004, p. 37), and refers to a conception of learning centered on the cognitive, motivational and behavioral components that provide the individual with the ability to adjust their actions and goals to achieve the desired results taking into account changes in environmental conditions (Zeidner, et al. 2000). Within the dimensions, there is a common and transversal axis which is self-control, Hernandez (2015) defines self-regulated learning as "an active process in which students establish the goals that guide their learning by trying to monitor, regulate and control their cognition, motivation and behavior with the intention of achieving them" (p. 6). Thus "how individuals improve and increase their academic outcomes by using a learning method in a systematic way" (Zimmerman, 2001, p. 8).

11. Dimensions of Self-regulated Learning

Executive

The activities of self-regulation, that is, making wishes, adopting strategies and putting them into practice in a specific context is vital for the exercise of the academic process. For this, it is very necessary to use effective strategies and, as a consequence, to be able to assimilate, prepare and retrieve facts. In addition, self-regulation of mastery refers to the amount to which students actively participate in their knowledge procedure in relation to three dimensions: metacognition, motivation and behavior. The self-governance procedure of learning is executed through a process that includes three levels: plan making, performance and reflected image (Hernandez, 2015, p. 101).

All components that can be given for the performance itself are deliberated, evaluated and reconsidered for the duration of the knowledge procedure. The execution is the problem that remains within the self-regulation that acquires the knowledge of the way; but it is the first in its method, since it depends on the lines drawn and the clean objectives of its execution or stagnation so it facilitates or damages the complete or planned metacognitive process.

Cognitive

According to Hernandez (2015, p. 19), he defined that self-regulation, in its cognitive dimension, involves recognizing and using a chain of cognitive strategies of record processing and, within metacognition, involves information and law of the cognitive procedures themselves. What is intended to be observed and refrained from are all cognitive. This involves constant cognitive monitoring, based entirely on evaluation strategies. That response to the cognitive procedure already raised from the moment it is determined to behave from self-regulation. It is necessary to mention that it is important to save and retrieve data of the procedures that show this cognitive measure for the execution of the project proposed at the beginning.

Motivational

According to Hernandez (2015), "the self-regulated domain in its motivational and emotional size involves volitional management techniques capable of generating in students a dedication to their study and control of emotional states. This method tracks, regulates and controls motivation" (pp. 30 - 31). Hence the volitional manipulation approaches: attentional awareness, self-instructions and self-

control. The self-regulated study presupposes above a dynamic version of knowledge acquisition with the interaction of cognitive, motivational and emotional resources. Therefore, we recall the fact that self-regulated mastery is an intentional and conscious technique. Self-regulated mastery in its motivational and emotional measurement involves volitional control strategies capable of producing in college students a commitment to know and control emotional states. It involves tracking, regulating, and controlling motivation through seeking the essential external assistance that is an indicator of good motivation or motivation seeking.

Environmental Control

From the physical, social and personal environment are cognitive, affective and motivational. From the management of the environment, Hernandez (2015) stressed that, from the behavioral point of view, the student has the ability to choose and configure the environments in which he develops, in addition to instruments, settings that allow him to optimize his knowledge acquisition (p. 33).

12. Discussion

After conducting the literature review on the inverted classroom and self-regulated learning in university students, there was agreement with Zúñiga-Escobar (2017) who presented, in his research, a didactic strategy is a procedure that is presented in an organized, formalized and oriented way; in this way, a clearly detailed objective is reached. Its application requires perfecting procedures and techniques whose design and choice correspond to the determined teaching staff, which have to choose skills and techniques that can be used to achieve the proposed goals. Following this definition, we can proceed to the definition of the strategy object of this study, flipped classroom, also known as inverted classroom. On the other hand, Borgobello, et al. (2017) raised as a purpose to describe those strategies that refer to cognition and metacognition, as well as the motivational models used by students in their learning. For Pardo (2015), self-regulatory strategies are important for reading comprehension of all types of text, as these allow planning, monitoring and evaluating the entire process involved in reading. Likewise, he concludes that students should consider those processes that are part of textual comprehension and those strategies necessary for it to be effective. Finally, she suggests the need for a proposal that contains self-regulatory strategies aimed at the reading process.

On the other hand, for Nouri (2016), the inverted classroom model is based on the fact that what is normally worked on in class is exchanged with what is normally done outside the classroom. Murillo-Zamorano et al. (2019) noted that, above other strategies such as playful learning,

cooperative learning and problem-solving learning, inverted classroom learning stands out for its flexibility and adaptation when used together with other methodologies, also noting that, thanks to the use of audiovisual elements, an emotional connection is generated with students. An interesting point about this strategy is raised by Steed (2012), who indicates that one of the great advantages is that students can use those devices from which they seem unable to separate themselves - referring to smartphones, tablets, etc. - for educational purposes. Moreover, as Akçayır and Akçayır (2018) indicate, the teacher helps the students, and is not only the one who delivers information. He achieves this through activities such as discussion, students' problem-solving proposals, guidance, etc. Similarly, Cheng, et al. (2018) let it be seen that many have been the studies related to the effects of the flipped classroom on student outcomes compared to traditional education. However, these results have been questionable. Finally, Bastacini and Kupczyszyn (2020) conclude that college student self-regulation leads to goal achievement through the use of cognition, as well as some emotional aspects.

13. Conclusions

Self-regulated learning will contribute in the student to enhance their abilities and aptitudes with the objective of allowing them to develop cognitive skills such as memory exercise, memorization, adequate comprehension, analysis and synthesis capacity, applying and creating new significant learning, as well as solving problems and making the right decisions either in a group or autonomously. In this way, this new learning will guarantee practical, confident and effective learners, responding to the demands of modern and globalized society.

The "Flipped Classroom" methodology can be applied in any context; it allows for an almost personalized monitoring of the student, it provides the necessary information, since it is hosted in the cloud and because it receives the necessary feedback whenever it is convenient. For this reason, many teachers are increasingly implementing it.

Self-regulated learning is a strategic learning; a constructivist cognitive perspective is evident, in which the learner builds his knowledge from the self-regulation of his learning process, which he does in a conscious and motivated way. Making use of motivational and metacognitive strategies.

Metacognition is a way of learning whose objective is that students have a clear understanding of "learning to learn", being managers of their own knowledge, self-awareness and self-regulation. The application of theoretical-practical metacognitive strategies applied by the teacher is decisive; likewise, virtual environments enhance knowledge assimilation.

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