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The inverted classroom in education: A resilient methodological tool for social change

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Abstract. The implementation of innovative experiences within the educational context is part of a transformation process where new information and communication technologies (hereafter, ICT) promote the use of methodological tools that contribute to conventional classroom systems, through the creation of virtual training environments that establish the development of audiovisual language and facilitate communication. The objective of the following article is to reflect on the implementation of the inverted classroom as a learning tool for social change that breaks the traditional paradigms of education and represents an option for redesign the curriculum model. It is also part of the Education Research project and Literacy in Communication and Audiovisual and Interactive Arts applied in intercultural contexts for the conservation and diffusion of cultures and ancestral knowledge in conflict or isolation. The study presents a qualitative-quantitative and documentary methodology, and a case of study uses a bibliographic investigation that contrasts the information with the data obtained from the application of data collection instruments such as surveys, and observation; that will allow establishing the appropriate parameters, and discussing the results that show the importance of the use of the inverted classroom in the teaching-learning processes to strengthen resilient, autonomous and meaningful learning, recognizing students as the main protagonists of new knowledge.

Keywords. inverted classroom, learning, education, resilience, social change

1 Introduction

The objective of this article is to reflect on the implementation of the inverted classroom as a learning tool for social change, and it is part of the Education Research project, Literacy in Communication, Audiovisual and Interactive Arts applied in intercultural contexts for conservation and dissemination of cultures and ancestral knowledge in conflict or isolation.

Hence, the use of innovative learning methodologies generates changes in the way of learning and teaching - learning spaces. Thus, conceiving the use of Information and Communication Technologies (ICTs) represents a pertinent decision in the digital age, and an opportunity for children and young people to acquire digital skills and attitudes in a world that needs greater sustainability and interdependence for the construction of knowledge, because its use will allow digital competences from transfer classrooms to homes and insert communication and information in the most remote contexts.

UNESCO (2016) indicates that the application of ICTs in education will strengthen science, technology, and innovation; It will strengthen education systems, the dissemination of knowledge, access to information, effective and quality learning, and more efficient service provision.

Undoubtedly, ICTs have transformed educational spaces, new learning environments burst in and are revolutionized in the face of emerging digital contexts, others arise that until now were non-existent: virtual, online or network communication environments, social networks, all of them with great educational potential. A new dimension of mobile learning in contrast to the old educational institutions (both formal and those that are defined as informal). Bailón & Rabajoli (2014).

However, the new learning modalities require a commitment, and it is a challenge for teachers and students, the teaching-learning process has a collaborative purpose, teachers in this sense must assume a paradigm shift and incorporate active and consistent learning strategies. including new social patterns and technological advances.

On the other hand, analyzing the inverted classroom model, its teaching-learning processes, the influence on school performance, reviewing the theoretical, methodological and social concepts in the students' levels of knowledge, also allows using it as a transcendental resource, to change traditional instructional processes, and represents an alternative to improve the organization of ubiquitous school activities (Blasco, *et.al*, 2016)

The inverted classroom not only organizes time inside and outside the classroom, but It is also part of a larger pedagogical movement that overlaps with blended learning, inquiry-based learning, and approaches that promote active student participation and flexibility within educational processes. (Flores, Del-Arco and Silva, 2016).

The use of the inverted classroom establishes parameters regarding the role of the teachers and students to increase learning and teaching progress. The work then adopts, as Blasco, *et.al*, (2016) states, "a restructuring of classroom work that allows better use of time order to maximize firstly, tracking tasks and resolving questions by the teacher, and secondly, encourage independent and cooperative work of students "(p. 13)

Likewise, in the Inverted classroom as a methodological resource has a binding role with the social factor because it is aimed at improving community living standards, besides this new interaction brings with it contexts where the scenarios are imprecise, this due to economic and social differences (Rodríguez & Corona, 2020, p. 2):

Resilience, interwoven with ICTs, can become a real path of capacity where people develop to face adversities. In hostile environments, as well as an integration mechanism to technological advancement that triggers options for adaptation and restoration of past experiences.

From this perspective, defining the physical or virtual contexts, which undoubtedly appear heterogeneous in learning, demands an awareness on the part of the student to understand and arrange their learning problems. In this sense, educational processes conceive new learning dynamics through the connectivity achieved through different platforms, that denotes an integration bridge in the application of ICT and of socialization of unfavorable and substantial situations for students, which go beyond and often unnoticed informal education. (Buckingham, 2013).

The case of this study was carried out in two schools in the rural sector of the Riobamba Canton, the students participating in the article had a wide cultural diversity, but also sometimes laughable attention to young people at a disadvantage regarding access to internet connectivity, however, it has also been observed that these rural contexts characterized by referring in their technological equipment: televisions, computer equipment, and video projectors, it was also analyzed the teachers' traditional educational model with obsolete paradigms, without major student participation. In addition to this, other types of problems such as the social conditions for the conservation and dissemination of cultures and ancestral knowledge in conflict. Despite this,

students under these conditions and without effective economic and family support carried out their learning process successfully.

For instance, it is important to point out that the use of the "inverted class, that supposes an important modification in the usual patterns of the teaching-learning processes, since it breaks with the traditional model and encourages the protagonism of the students in their individual and collective aspects" (Blasco, *et, al*, 2016, p. 3).

As was mentioned, it is evident that the results of the application of this methodology as an innovative technological resource in this research denotes an alternative to promote active, cooperative, and meaningful learning which motivates the development of students' digital skills.

2 Theoretical Framework

2.1 The inverted classroom

Currently, education requires changes in the teaching-learning processes, the use of active and innovative methodologies are a fundamental element for the acquisition of significant and collaborative learning, that is why the emergence of new Information Technologies and Communication (ICT) has important effects in today's society, its implementation requires a paradigm shift in the educational system, where teachers are open to becoming part of these changes, that use, select and implement practical and flexible methods in the educational process.

The idea of the inverted classroom was originally born from the authors (Lage, Platt, and Treglia, 2000) who perceived the way of giving lectures or classes that was a technique of exposing content where did not attend to the variety of learning rhythms of each student.

The inverted classroom (or Flipped Classroom), arose the necessity in taking advantage of the new Information and Communication Technologies based on education, this methodology transformed several processes that were usually linked to the traditional classroom, those were transferred to the after-school context (Arellano *et al*, 2015, p.1), the educational system needs to redesign the curriculum and other teaching-learning methods and procedures, consistent with the updated information and communication technology.

In the case of the educational system, it has been part of a traditional, eminently behavioral model, where students face a passive role and are mere recipients of knowledge, flipped model aims to achieve a switch the thought in the teacher into innovative, autonomous and flexible attitude, that are applied inside and outside the classroom allowing the student improvement learning and creating quality educational settings (Godoy et *al*, 2016).

Notably, the Flipped classroom motivates student-centered pedagogy to improve the assimilation and retention of information through the use of techniques linked to active learning (Calimeris and Saue, 2015). Moreover, Raad (2015) established the fundamental advantages of the inverted classroom properly used by the teacher, it can stimulate the participation and collaboration of students during class. Some of the online services that can most motivate this collaborative vision of learning are platforms such as YouTube, among others.

From all the above, the interest is focused on how to use an innovative methodological strategy, which includes the inverted classroom, in the field of communication, in the exchange, access, and processing of information productively and independently.

The implementation of this model has been favored by the potential of Web 2.0 (Ortega, 2016) establishes some advantages around this model, which offers new search possibilities, creation, publication and systematization of knowledge, information and resources through the usage of internet, offering new perspectives in the teaching-learning development process and minimize the traditional roles that some teachers and students currently assume.

Prioritizing a comprehensive approach that increases commitment, active, and creative participation according to the following advantages.

The Advantages of an inverted classroom approach

- It allows us to combine the class with other types of more individualized, productive, and creative activities.
- Empower non-linear distribution chairs in the classroom, which enhances the environment, exchange, and collaboration.
- It fosters motivation, innovation, productivity, and rationality with the use of new technologies.
- The contents are accessible to the learner at any time.
- It involves families or other agents that promote learning.

The inverted classroom, in the words of (Bergmann and Sams, 2014), is suitable to prevent students from missing classes, for whatever reason, in this case, the contents will be recorded, taught, and distributed to students for viewing at home before class. Work in the classroom consists of carrying out projects to put into practice the knowledge acquired and resolve doubts, thus inverting activities concerning the traditional model. (Figure 1) Moreno (2015), explains the scheme of this new teaching approach and the differences with the traditional model

Source: Moreno, (2015). Inverted classroom: another way to teach and learn. Recovered from https: // www. Cloudiamia. com / inverted-classroom-another-way-to-learn

Figure 1. A new approach to teaching and the differences with the traditional model

2.2 Resilient learning through ICT`s

The technological age at present has made ICT'S an important component in the information society media. Resilience and its relationship with Digital Competition and whether we can promote it through digital means.

Resilience is a process of adaptation and balance between risk and protection factors, so there is the possibility that having more digital training is currently configured as a protection factor for groups at risk of social and digital exclusion. On the contrary, having a low training in digital competence can be a risk factor for social and digital exclusion for those groups that are at risk of exclusion.

ICTs as digital tools within the teaching-learning processes are variable and have a wide range of applications, reviewing the arguments that arouse interest to explore issues around virtual media, it can develop processes that help people overcome adversities, find the limitations that

may exist or what ethical approaches are necessary for heterogeneous learning contexts. Also, not much is known about how people apply ICT to deal with problems, obstacles, and difficulties; questions such as: what are the elements that influence a person to adopt technology to overcome misfortunes or what are the factors that hinder it or what means have the greatest potential for it. (Vaquero, 2013)

It is important to concentrate the attention into theoretical-practical experiences in contexts that analyze the challenges and opportunities that the use of technologies envisages in the educational field, and how their design and implementation can become resilient support for social change. Practices and strategies to promote social support (formal and informal) put peers and other professionals in contact that allow advice, guidance, and support when necessary. Added these practices it appears the professionals and families search based on positive use of technology in contrast "non-face-to-face" and "semi-face-to-face" ways of offering and providing social support and parental that do not exclude the previous ones, but complement them. (Tió, *et, al*, 2016).

On the other hand, the use of innovative methodologies, and the paradigm shift regarding the conception of education, brings with it the idea of promoting that students learn to work together in small groups, this aspect has been emphasized since the education science through the ages, but the ability to combine the two ideas (computational support and collaborative learning), for example, the inverted class inserted in virtual platforms (collaborative learning supported by computer).

This is an emerging area of the learning sciences and investigates how people can learn together with the help of computers, this seemingly simple statement involves a considerable complexity of intervening factors difficult to measure. The inclusion of collaborative aspects, mediation by technologies, and distance education has problematized the notion of learning and has led to new questions about how to study this process, which has not yet been answered. It is precisely in this context that the relationship between resilience and digital competence emphasizes the development of a collaborative framework through a computer. (Malberti, 2013)

3 Methodology

This study uses an aligned methodology within the qualitative-quantitative and documentary paradigm, and the case study, which will allow observing and analyzing the implementation of the inverted classroom as an innovative resource in the teaching-learning process, through meaningful and cooperative learning. The qualitative approach compiles specialized bibliographic information from the documentary review, which corroborates the information contrasting it with the participant observation (Cohen, Manion and Morrison, 2007).

After the participant observation process, semi-structured interviews were conducted with educational managers in the field of computing at each institution, to have a perception of experiences in digital skills and the use of computer equipment.

The surveys were applied to a sample of 328 students from the two schools, with an age range of 15 to 17 years, in which students with ubiquitous and subjective learning characteristics could be identified on the variables investigated. (Figure, 2).

Source: Taken from the Education and Literacy Research project in Communication and Audiovisual and Interactive Arts

Figure 2. Sample of students from BGU rural schools in the Riobamba Canton

The methodological process of this article allows a theoretical reflection of the research object, based on the recognition of the context from the study population, the data obtained tries to review the incidence of the use of the inverted classroom as a resilient technological tool for social change, taking into account the heterogeneous contexts where students and teachers are found.

The applied surveys relate the content to be evaluated around five areas of digital competence: content creation, communication, information, security, and problem-solving. (Figure, 3).

Source: Taken from the Education and Literacy Research project in Communication and Audiovisual and Interactive Arts

Figure 3. The five areas of digital competence

The information collected analyzes the digital culture of students in the rural schools studied, taking into account that education is a transforming element in the training process of students that, mediated by new technologies, will reach young people. access to knowledge.

The case of study, on the other hand, was used as one of the applied techniques due to the qualitative nature of this study and as it says (Martínez, 2006), it is a tool that demonstrates its strength that helps to measure the behavior of people.

Likewise, the observation completed the most significant findings identified inside the classrooms. A documentary review was also carried out to support the research, regarding the theoretical part of this study, based on obtaining information from current theories.

4 Results and discussion

Considering education as an indispensable element for social transformation stands as an important tool to improve people's living conditions, the advancement of people, and the consolidation of cultures. The technological era in which we find ourselves requires us to insert in the teaching-learning processes, innovative methodological strategies that transform educational dynamics into environments for the acquisition of active, cooperative, and reflective knowledge, through the use of new technologies of communication and information.

Thus, the use of the inverted classroom implies other ways of learning, a paradigm shift, with novel concepts, sustained in a theoretical framework where the knowledge society imposes new challenges and challenges for teachers and students as active, innovative and transforming entities capable of developing their potentialities, those of the group and their socio-cultural environment. (Ortega, 2016)

Educational systems currently incorporate these forms of communication and information within the teaching-learning processes; technological development has impacted all areas of human life, including education, "for a few years now, computing and technology have generated great changes and at the same time revolutionized the way of perceiving a globalized world in the educational field "(Huertas & Sánchez 2015, p. 42).

The traditional methodology usually shows the teacher as the one who imparts knowledge and is the active protagonist of the educational process, in this study, we analyze the roles assigned to the actors of the teaching-learning process both from the traditional paradigm that is contrary to the reverse classroom model, where the contents are strengthened, and the activities consolidate to solve doubts with the help of the teacher, who will guide the student in the teaching-learning process, it will be one in charge of choosing the most convenient didactic tools for students taking into account the training criteria that come from outside. Table (1) shows the characteristics that differentiate the roles assigned to the actors both in the traditional school and in the model of the inverted class.

Table 1. Characteristics that differentiate the roles assigned to the actors both in the traditional school and in the inverted class model.

Actors	Traditional School	Model of the inverted classroom
Teacher	The transmitter of knowledge, active protagonist and authority in the teachinglearning process,	Collaborator and an active member in the teachinglearning process
Student	The passive subject in the teaching-learning process; learner and recipient of teacher knowledge.	Collaborator and an active member in the teachinglearning proces
Activities and resources	Methodologies and resources focused and chosen by the teacher,	Innovative and interactive activities and resources where the main actor is the student
Didactics	Bank education, memory	Dialogic education, cooperative Creative and dynamic

Source: Adapted from Tourón & Santiago (2014). The Flipped Classroom: How to turn the school into a learning space. *Digital-Text*.

The paradigm shift in the conception of the educational process, evidenced in (Table 1), analyzes the new conceptions regarding the application of the inverted classroom, where it is demonstrated how the insertion of this model in classes to improve digital culture, therefore, it is essential that, in the development of this model, the previously student access of the content material at home; either in audio, video or document format, and that you can communicate online with both colleagues and teachers, and questions are raised about what is not understood about the content.

Consequently, when a student has reviewed the material several times during the class, the teacher's task is to consolidate and deepen the contents together with his or her learner, so that the activities are carried out cooperatively with the participation of some other students, then an Inter-learning, where doubts are resolved by the teacher, situations of frustration are dissipated that arise from the experiences of teamwork, and also individual problems decrease. (Gunawardena, 2009)

The application and the way of applying this model in the classes, is enhanced with the use of technology, and that is the key to this innovative resource, hence:

> Taking into account the diversity of scenarios in which education occurs, especially in spaces such as school, it is necessary to rethink educational processes, specific curricula, pedagogical practices, and learning evaluation, around two key aspects that emerge from this panorama: other communication styles that they should be considered to guide pedagogical practices; and types of textualities (alphabetical, visual, sound, audiovisual, digital) that could favor the construction and expansion of more flexible and open school content for the development of certain learning in students. (Amador-Baquiro 2018: 5)

For all the aforementioned, it is pertinent to point out that virtual education responds to current needs, it offers alternatives and solutions to situations that the traditional school cannot attend, so the inverted classroom model is part of the challenges that the educational system in society takes on day by day, we also have the certainty of how important the application of ICTs is in the teaching-learning process, its insertion in ubiquitous contexts flexibly and collaboratively, in the application of the effective model internet connectivity is imperative.

The results obtained from the semi-structured interviews carried out and from the surveys, the bibliography reviewed, and the theory found to have an evident relationship, these instruments compare the previous schemes and identify the interests of the group under study, the research shows that there is a significant percentage of students who do not have internet access. (Figure 4)

Source: Taken from the Education and Literacy Research project in Communication and Audiovisual and Interactive Arts

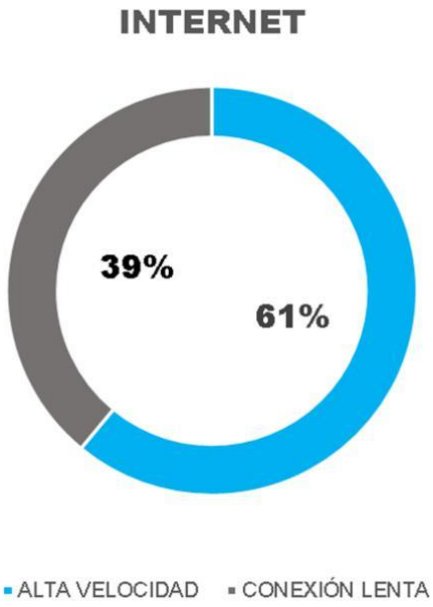

Figure 4. Connectivity

We also carried out an exploratory analysis to identify students living in adverse situations, through the first identification of perceptions and actions that were considered relevant and significant to face them, as is the case of the potential development of digital skills, in which it has to do with the use of the internet, in the personal and academic sphere as shown in (Figure, 5) and in (Figure, 6)

Source: Taken from the Research project Education and Literacy in Communication and Audiovisual and Interactive Arts

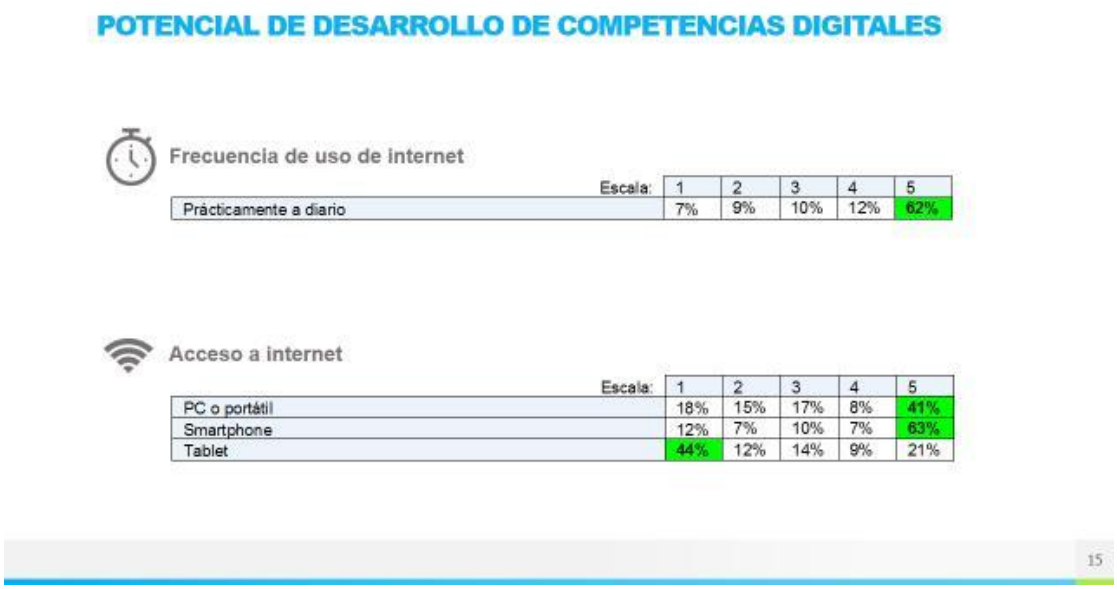

Figure 5: Frequency of Internet use and access

Source: Taken from the Education and Literacy Research project in Communication and Audiovisual and Interactive Arts

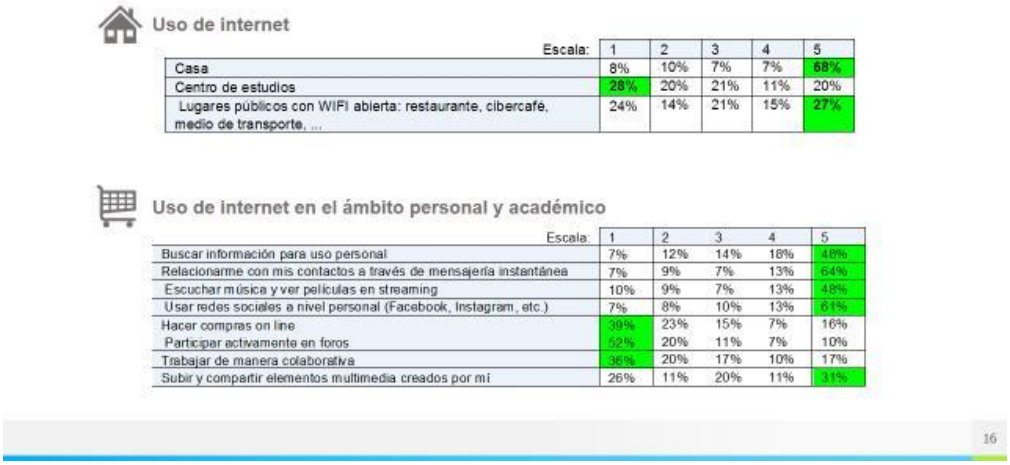

Figure 6: Internet use in personal and academic settings

In (Figure 5) and in (Figure 6), we see how connectivity and factors related to the diversity of conditions and lifestyles undoubtedly have perspectives terogéneas, students have access to electronic equipment at home (wireless computer, laptop, smart mobile phone), but there is a percentage that although it does not have internet connectivity, an important element for the effective use of innovative methodologies such as inverted class, it has then been identified that there are critical phases or adverse situations as essential elements for raising awareness of the implementation of resilient methodological tools that contribute to transformation and social change.

The findings recovered in this study showed us how the inverted class methodological model integrated digital and virtual elements, videos, and images related to the importance of the use of ICTs in education as a means for students to identify what, how, where, and why learn.

In (Figure 7), the students referred to the communicative aspect: interaction, sharing, behavior, digital identity, and these elements are preliminary indicators that account for the responsibility, assertiveness, and self-knowledge of resilient people.

Source: Taken from the Education and Literacy Research project in Communication and Audiovisual and Interactive Arts

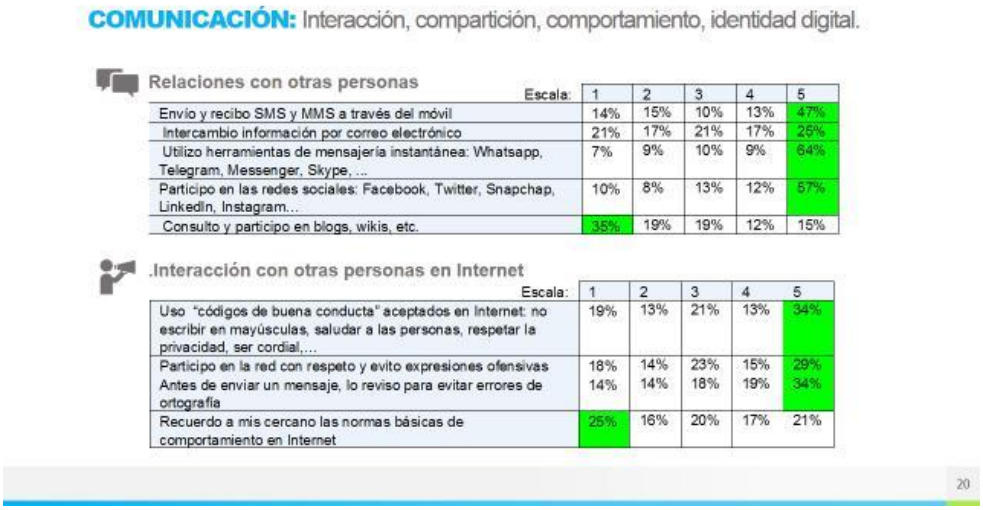

Figure 7: Communication: Interaction, sharing, behavior, digital identity

Finally, the analyzed aspect of communication indicates the interactivity of the students, using messaging tools or social networks and indicate their behaviors on the network, we evidence how most people use codes of good conduct, take care of their virtual identity; These aspects according to Grotberg (2006) are support for analysis and systematization of the various factors that indicated as constituents of external supports, which promote resilient learning; the inner strength, which develops over time and sustains those who are faced with some adversity; and finally interpersonal factors understood as the ability to solve problems that lead the person to face adversity. The most important source of resilience is being a person who respects him or herself and others. Mediators who support their learning in problem situations are television, the internet, the computer, and people.

5 Conclusions

The analysis carried out based on the Inverted Class Model shows how the application of innovative methodologies places the student as the protagonist of their learning process, it represents that learners are the main actor in the educational process, confirming that the model is an alternative in contrast to the traditional model of education.

Besides, it is evident how the new logics of dynamic and dialogical learning use ICTs to generate changes in the curriculum and methodologies to achieve educational quality, where learning meets the replica of converting knowledge as meaningful learning and ceases to be individualized learning that becomes cooperative learning, which develops specific connections between all those involved in the teaching-learning process.

The Flipped Classroom or inverted classroom model corroborates the results obtained in the surveys, with the bibliography analyzed that confirms how the model fits with the principles of education and information and communication technologies as a pedagogical challenge in today's knowledge society and agrees with the Ministry of Education to improve the quality of leaning with the incorporation of Information Technologies through the Digital Educational Agenda 2017 - 2021, considering the curricular integration of information technologies and using them to learn a concept, its process, a specific curricular discipline. The integration of

ICTs is to make them part of the curriculum, to link them harmoniously with the other components, to use them as an integral part of the curriculum and not as an appendix or peripheral resource (Sánchez, 2003). This proposal suggests an educational transformation through digital culture, through a new curriculum: a dynamic one, always updated, connected to the network, constantly changing, adaptive; that is to say, a living curriculum. Therefore, the Curriculum is presented online, as a fundamental and emblematic project of the Digital Educational Agenda.

Under these considerations, the Undersecretary of Innovation and Good Living in August 2017, by the Ministry of Education, takes charge of the execution of the Computer Science project, sponsoring it from the approach with UNESCO-Quito in October 2017 and the articulates with the Digital Educational Agenda 2017-2021, all this through a scope to the Framework Agreement for Technical Cooperation.

The research also shows how ICTs are a resilient tool that must include indispensable and necessary ubiquitous practices, so that as we have said throughout the manuscript, students are the protagonists of the teaching-learning process, and traditional education takes another course in the ways of teaching and learning, with effective communication, that focuses its attention on the role that the current student plays, due to the impact of new technologies and globalization.

In short, this study leads us to reflect on the limits and benefits of applying the inverted classroom model and requires us as teachers to prepare, plan, and work before the implementation of the model. Understand ICTs as one more resource among the many that exist in educational processes, and that must be used on time without neglecting the pedagogical and dialogical experiences that are inscribed in the act of educating and the interaction between teacher and teacher.

Virtual education and digital skills undoubtedly tend to generate spaces, resources, and methodologies where communication facilitates teaching-learning processes, and the teacher shares with his students from a logic of learning to learn from ubiquitous and resilient environments in terms of to the access of ICT.

Declaration of conflicts interest: The authors declare that there are no conflicts of interest.

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