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# Models for the pedagogical integration of information and communication technologies: a literature review

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## Abstract

Education was, is and will continue to be a field full of questions: Why to teach? What to teach? How to teach? What, how and when to evaluate? Moreover, while the same questions persist, answers to them do not. They are dynamic, and they are transformed according to the demands of the family, the company and government policies. To address these considerations, this article aims to present the results of research into the literature of the last two decades on the elements that characterize a pedagogical model and that have been taken into account in explorations with regard to the educational integration of information and communication technologies and to identify gaps for future research. The results show that only 11% of the literature reviewed addresses the four questions listed above and concludes on the need to deepen the factors that affect the success of the changes that are introduced in the school, which seek to generate processes of educational transformation, from a holistic perspective.

**Keywords:** Teaching. Educational models. Pedagogical trends. Curriculum. Evaluation.

## 1 Introduction

It cannot be denied that the education system of the 21st century requires profound changes to respond to society's needs, particularly those related to social and economic changes. Therefore, new "skills and competencies required by the educational standards that each student must be able to achieve

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by the end of compulsory education” must be developed (INTERGUAYAMA, 2010, p. 3).

For this reason, leaders in education from international organizations have come together to formulate a global framework enabling countries to face the challenges of the information society. An example of this was the World Summit on the Information Society (Geneva, 2003; Tunis, 2005) convened by the International Telecommunication Union (ITU), which defined goals that can be adapted to the plans and policies of each nation. These goals are meant to guarantee equal opportunities and quality education that responds to the needs of all students, where lifelong learning and diversified teaching of information and communication technology applications in social and economic fields are promoted for improving learning processes and developing student competences (BETANCOURT, 2004; DECLARATION OF INCHEON, 2015; UIT, 2005).

To meet these demands, numerous investigations have been conducted around the world describing experiments with technology integration in specific contexts. Although many studies have reported successful results with regard to the use of technology to improve students' motivation and learning, there seems to be a disconnection in the holistic reflections regarding visions for the type of person to be shaped, the curriculum, the pedagogy, the types of relationships of the actors involved, and the evaluation of learning that characterizes each educational institution. In this regard, Fernandes et al. (2016), highlight the importance of school management to promote the organization, mobilization and articulation of material and human conditions to ensure the effective progress of educational processes.

Some research (BADILLA QUINTANA; MEZA FERNÁNDEZ, 2015) has focused on producing scenarios in which teachers can create learning situations that simulate training experiences for students. These experiences are encompassed in the implementation of virtual environments for collaborative work and social networks where interaction is valued.

Other research has adhered to the Technological Pedagogical and Content Knowledge (TPACK) model to improve performance of teaching and learning processes in specific areas (SAMPAIO, 2016; TAI et al., 2015). These studies report positive results when the model is used mainly for learning organized writing as well as in the absorption of content. Others have focused on investigating the reasons why teachers integrate information and communication technology (ICT)

into their classes. Results reveal that the use of these technologies is directly proportional to the teacher's mastery of them as well as to resources availability, to how much they motivate students and to the use of constructivist methods in teaching/learning processes (PETKO, 2012).

Teachers' perception of the integration of technologies, the competencies they possess and their relationship are public policies that have also been subject of research. An example is the study carried out by Herrera et al. (2018), who conclude that perceptions and experience of teachers are fundamental factors for the educational integration of ICTs and that there is not necessarily a relationship between their learning and the requirements of the regulations.

Along these same lines of teacher beliefs, the studies report that teachers seldom use multimedia resources like YouTube videos, since they believe that these media are only used for fun and for motivating activities, and do not require much effort by students in terms of processing information (KRAUSKOPF et al., 2012).

Other studies have focused on the use of an electronic portfolio for the development of cognitive skills in b-learning environments. They conclude that the use of these portfolios, together with problem-based learning models, helps develop problem-solving skills and critical thinking, since they allow students to create, synthesise and systematise conclusions (KORANEEKIJ; KHLAISANG, 2015)

In another vein, some researchers have studied the influence of connectivity as a model for training industrial design students, finding positive results related to the creation of learning networks through online courses and other technology tools such as wikis, blogs, and 3D printing, all of which contributed to the absorption of knowledge and student creativity (RENDA; KUYS, 2015). Other studies have focused on collaborative work to create scenarios where future teachers face situations in which they can simulate the decisions required in teaching students.

Finally, although there are initiatives to create models and experiences for training students and teachers that incorporate technology, educational institutions must review and adjust the strategies implemented by first analysing aspects such as the vision for the type of person that they want to shape, the curriculum, the pedagogy, the types of relationship between the actors involved and the evaluation of learning. Results should provide a clear vision for addressing the pedagogical

strategies that promote lifelong learning: learning to know, learning to do, learning to live together and learning to be.

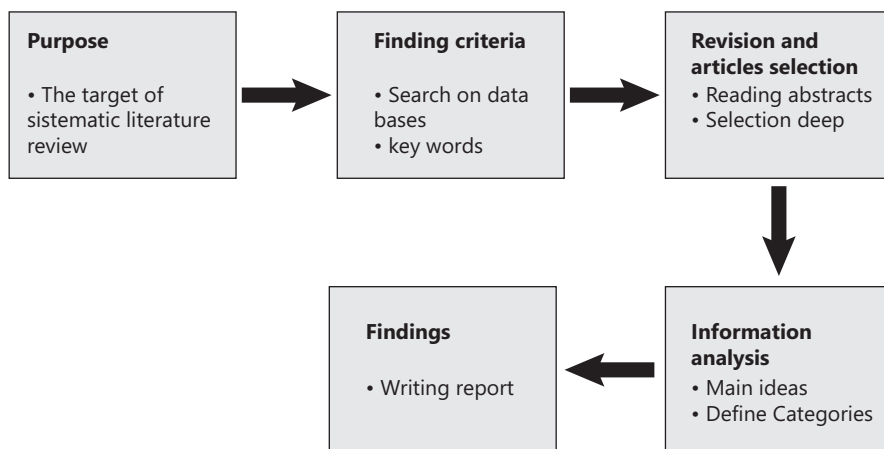
Therefore, if the integration of technology is indispensable for the 21st century education, then it is imperative for the pedagogical models of educational institutions to adapt to this need. This article intends to present a bibliographic review of the elements that should be considered in the integration of ICT into education in order to understand how they relate to current pedagogical models and to identify areas for future research.

## 2 Review methodology

The methodology for the literature review was systematic, taking into account the stages illustrated in the Graph 1, adapted from the Okoli and Schabram's (2010) approach.

### 2.1 Objective

The objective of the bibliographic research was to use the learning experiences of students or teachers that involved the pedagogical integration of ICT to identify how these strategies are related to the elements that define a pedagogical model.



Source: Prepared by the author (2017).

**Graph 1.** Review method

## 2.2 Initial search criteria

Electronic searches were conducted in educational databases such as Scopus, Jstor and ProQuest. In addition, different combinations of keywords were used, such as “ICT integration models”, “ICT and teaching”, and “ICT and learning”. Based on these search criteria, a total of 3,397 high-quality studies published from 1994 through the first quarter of 2017 were found.

To further refine the results, a search filter using keyword combinations was applied. Furthermore, from the resulting 644 publications, only 20% of the articles were selected as shown in the Table 1.

## 2.3 Selection of articles and reading

Once the potential articles were identified, a preliminary reading was carried out to verify that they met the following criteria:

**Table 1.** Articles published by year

Database	Keywords	Articles meeting the criteria	Filter	Articles meeting the filter criteria					
				2017-2012	2011-2006	2005-2000	1999-1994	TOTAL	
Scopus	ICT Integration model	853	Article/Social	Number published:	142	102	21	3	268
				Number selected: 20%	28	20	4	1	54
JSTOR	ICT Integration model AND learning AND teaching	324	Education: primary, middle, high ICT	Number published	45	88	48	4	185
				Number Selected: 20%	9	18	10	1	37
ProQuest	ICT Integration model AND learning AND teaching	2,220	Primary teaching methods innovations models	Number published	123	60	8	0	191
				Number selected: 20%	25	12	2	0	38
Total		3,397	Σ 20%	62	50	15	1	129	

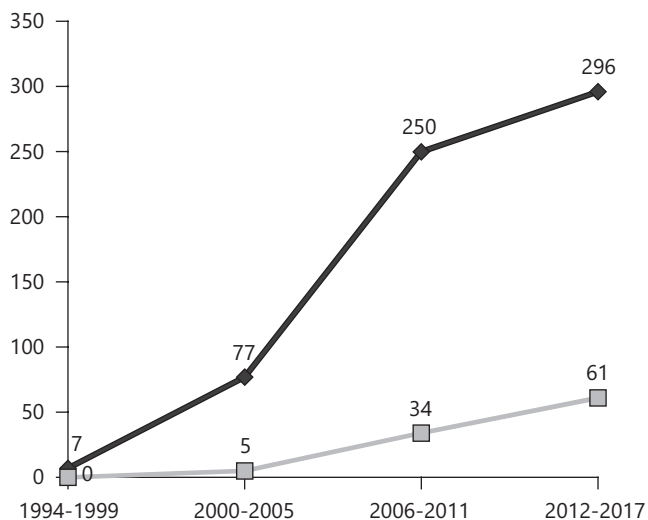
Source: Prepared by the author (2017).

- Studies related to practices that incorporate ICT for teaching or learning
- Studies that consider strategies for incorporating ICT into teaching at any level of education
- Studies including at least one element related to the definition of the pedagogical model

Finally, the first 100 articles that met the selection criteria were chosen. The Graph 2 shows them organized by year:

## 2.4 Organization and analysis of the information

An in-depth reading of the articles focused on identifying how the authors approached the following questions related to the attributes required by a pedagogical model: “Why to teach/learn?”, “What to teach/learn?”, “How to teach/learn?”, “When to teach/learn?”, and “What, how and when to evaluate?”. In addition, we highlighted the foundational educational models that were used and whether they were linked to a pedagogical theory or not.



Source: Prepared by the author based on Scopus, ProQuest, Jstor (2017).

**Graph 2.** Documents publishing and selecting per year

Data were organized in tables using software programs such as QDA Miner, Excel and SPSS.

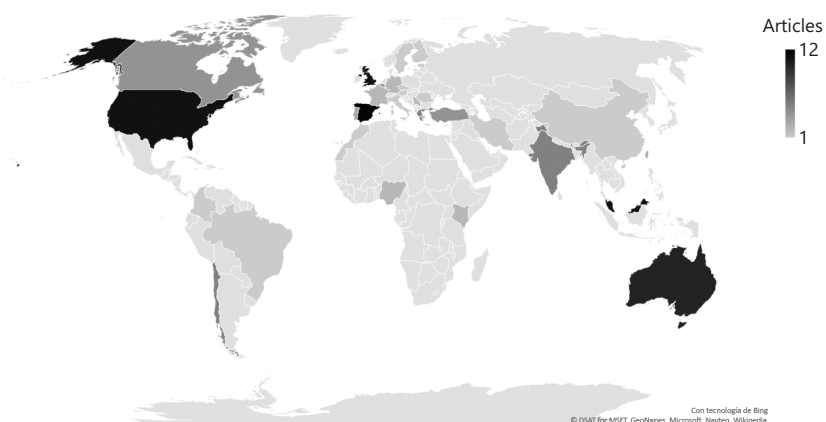
## 2.5 Reporting of results

Once the in-depth review of the selected articles was concluded, we drafted the results report and established the relationship between the approaches for incorporating technology into educational practices and the characteristic elements of a pedagogical model.

## 3 Results

All the selected articles describe strategies for incorporating information and communication technologies into teaching or learning. Of these, 57% report on the results of projects in basic and secondary education and 10% in higher education, and 33% correspond to teacher training studies.

The countries of origin of these articles are shown in Graph 3. The country with the largest number of publications in this area is Spain, with 11% of the total. The United States, the United Kingdom and Malaysia each account for 10% of the total, followed by Australia with 9%. Chile, Greece, India, Belgium, Canada and Turkey each represent 4% of the total, while Portugal and Taiwan each account for 3%. Germany, France, Kenya, Nigeria, and Serbia each constitute 2% of the



Source: Prepared by the author (2017).

**Graph 3.** Documents selects country



total. Other countries accounting for only 1% each of the total are China, Austria, Brazil, Colombia, Estonia, Finland, Iran, Italy, Morocco, Norway, New Zealand, the Czech Republic, Romania and Sweden.

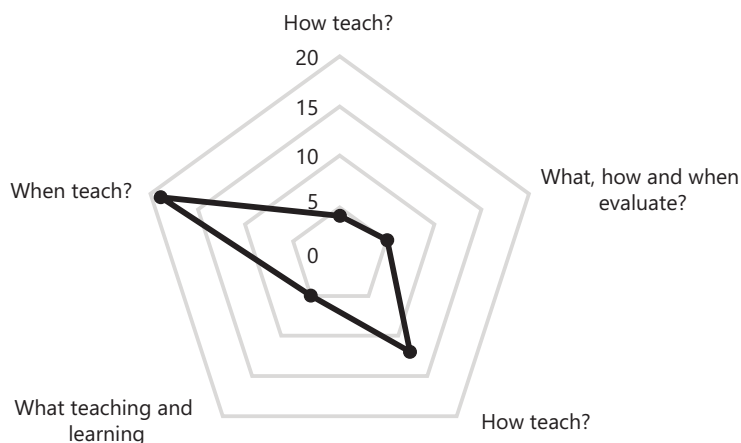
It is relevant to approach the five questions that define a pedagogical model, illustrated in Graph 4. Of the articles reviewed, it was found that 28% only address one of the questions, 35% address two questions, 26% address three questions, and 11% address four questions. None of the articles addresses all five questions.

Furthermore, 58% of the selected articles establish a relationship between the strategy and a foundational educational model, while 25% associate the study with a theory of learning. Only 17% of the articles mention both, while 34% make no mention of either.

## 4 Synthesis of the information

The following is a synthesis of the findings identified in the approaches for incorporating technology into educational practices and possible relationships with a pedagogical model, based on the five questions that define it (COLL, 1991).

### 4.1 Educational models for the integration of ICT and



Source: Prepared by the author (2017).

**Graph 4.** Strategies of ICT integration reported

## related pedagogical theories

In order to provide a conceptual framework to understand how teachers integrate ICT into teaching and learning processes, 17% of the studies reviewed use the TPACK model developed by Mishra and Koehler (2006) (some are shown in Table 2). Murthy et al. (2015) and Warriem et al. (2014) build on this knowledge base with the A2I model (Attain-Align-Integrate). Similarly, the teacher's role in process innovation is analysed via the K20 model (WILLIAMS et al., 2008), the Teaching Development Programme model (TDP) (ALBION et al., 2015), the Concerns-Based Adoption Model (CBAM) (KARMESHU et al., 2013; PEARSON, 2015), and the Technology Acceptance model (ALRESHEED et al., 2015). Regarding the study of the dynamic relationships between learning agents and ICT, Toh (2016), Zagami (2013) and Lin (2011) used the ecological model as a reference point.

Additionally, in order to understand the process of adopting educational innovations resulting from the incorporation of ICT, 7% of authors analyse the relationship between the perceived attributes of the innovations and their rate of adoption by applying the theory of diffusion (Table 2).

Moreover, the design of learning environments founded on strategies that involve technologies is based on instructional design models such as the KOLB model (EBISINE, 2015), the Substitution Augmentation Modification Redefinition (SAMR) model (HAMILTON et al., 2016; NKONKI; NTLABATHI, 2016), and the Learning Cycle model (YILDIZ; KOÇAK, 2016), which enable the active participation of students.

The learning strategies that are gaining strength are based on e-learning models (ALKOUDMANI, 2015; ARIF et al., 2015; DEBANDE, 2004) and the flipped model (KOSTARIS et al., 2017; CHEN; CHANG, 2017; GARCÍA-SÁNCHEZ; JOSE, 2017; KOSTARIS et al., 2017), from which the self-regulated learning

**Table 2.** Studies based on the TPACK model and on the theory of diffusion

TPACK model	Theory of diffusion
Kabakci; Coklar, 2014; Koh et al., 2013; Koh; Sing, 2011; Chai et al., 2011; Sangra; Gonzalez-Sanmamed, 2010; Jimoyiannis, 2010; Lefebvre, 2014; Hofer; Grandgenett, 2012; Van Laer et al., 2014.	Nyagowa, 2014; Emin-Martinez; Ney, 2013; Vanderlinde; Johan, 2011; Liu et al., 2010; Sloep et al., 2006; Niemel; Helevirta, 2017.

Source: Prepared by the author (2017).

model was born (CARNEIRO, 2006). Additionally, there are references on problem-based learning (ARATI et al., 2011; VIRKUS, 2008), Digital Game Based Learning (DGBL) (COUCEIRO et al., 2013; EMIN-MARTINEZ; NEY, 2013; LOCKLEY; BOYLE, 2014; MANESSIS, 2013;) and object-based education (RAJU et al., 2016).

Finally, the literature reports that theories of learning associated with the aforementioned models are based on the thought of Papert, Piaget and Vygotsky (DREHER et al., 2009). The premise is that the creation of knowledge and the acquisition of skills are active and interrelated processes, hence the relationship of ICT integration strategies with social constructivism. This strategy contribute to the collaborative and student-centred learning (COUCEIRO et al., 2013; GARCÍA-VALCÁRCEL et al., 2013; KOH; SING, 2011; KABICHER et al., 2009; MARTÍN; DE ARRIBA, 2017; MURTHY et al., 2015; PEINADO-MIGUEL et al., 2013; WANG, 2008).

The tendencies for each question about the pedagogical model, found in the literature are shown below:

## 4.2 Why to teach?

The studies reviewed refer to the digital inclusion as a necessary condition for achieving social equity and justice (RANIERI et al., 2009; WILLIAMS et al., 2008). A quality education that is based on key competencies for personal development, social integration and for autonomous creative and innovative work that enables individuals to develop throughout life. (CAMPIÓN et al., 2016; GARCÍA-VALCÁRCEL et al., 2013; KARMESHU et al., 2013; NYAGOWA, 2014; ONWUAGBOKE et al., 2015; PEINADO-MIGUEL et al., 2013; SEGREDO et al., 2017; SILVA et al., 2014; VANDERLINDE; JOHAN, 2011; WILLIAMS et al., 2008).

Additionally, authors as Kabakci e Coklar (2014), Kabicher et al., (2009) e Zhu, 2013 and advocate for teaching ethics to ensure that citizens use technology appropriately and for cultural change to recognize new values, norms and ways of doing things.

## 4.3 When to teach?

The way in which the protagonists in the educational context are related determines when to teach or learn, hence the importance of clarifying the roles of the actors involved in this process.

In 90% of the literature reviewed that addresses the role of the teacher, it is stressed that the responsibility for planning or managing learning activities falls on teachers. Therefore, one could say that it is the teacher who decides when to teach or learn. It also points to the student as the centre of the educational process and stresses the need for students to assume active and highly self-directed roles in learning environments involving technology.

Table 3 presents some of the authors that explicitly address the roles of the teacher and the student.

#### 4.4 What to teach?

It was found in the literature that content developed in the context of the reported educational experiences was created from two perspectives: global curricula based on standard guidelines and structured by discipline, and flexible curricula

**Table 3.** Literature that discusses the roles of teacher and student

Teacher is in charge of planning and designing learning activities	Student is at the centre of the educational process and is responsible for his or her own learning
Koh et al., 2013; Tapiska et al., 2016; Chai et al., 2011; Jimoyiannis, 2010; Lefebvre, 2014; Lagrange; Erdogan, 2009; Ham; Cha, 2009; Dani; Koenig, 2008; Deane, 2006; Ruthven; Hennessy, 2002; Sharifa; Watters, 2012; Taylor; Duran, 2006; Karmeshu et al., 2013; Liu et al., 2016; Ursavas, 2015; Vanderlinde; Johan, 2011	Nyagowa, 2014; Warriem et al., 2014; Koh et al., 2013; Raju et al., 2016; Lin, 2011; Webb, 2006; Kabicher et al., 2009

Source: Prepared by the author (2017).

**Table 4.** Origins of curricular content

Global curricula based on standard guidelines	Flexible curricula: core educational experiences
Campbell et al., 2015; Alresheed et al., 2015; Silva et al., 2014; Arati et al., 2011; Ruthven et al., 2009; Lin, 2011; Tallvid, 2016; Chee; Mehrotra, 2012; Hutchison; Reinking, 2011; Ham; Cha, 2009; De et al., 2011; Zagami, 2013; Vanderlinde; Johan, 2011	Ranieri et al., 2009: Mobile learning Deane et al., 2006: Creation of digital content Williams et al., 2008: Authentic learning Smith et al., 2009: Project-based assignments Pohl et al., 2008: E-learning from ECODESIGN Suárez-Guerrero et al., 2016: Use of tablets by children ages 5–6

Source: Prepared by the author (2017).

based on core educational experiences and supported by mobile learning, digital content, the promotion of authentic learning and project-based assignments, among others. Some examples are presented in Table 4.

Regarding curriculum design, Ham and Cha (2009) note that the categories used to define curricula are quite similar among different countries and stable over time, despite local idiosyncrasies such as economic conditions and socio-historical characteristics. Under these conditions, it is expected that a well-planned curriculum will lead to the comprehensive development of the student (EBISINE, 2015). An example of this is the spiral curriculum, characterized by an iterative process of content review (MURTHY et al., 2015; WARRIEM et al., 2014).

Nevertheless, there are those who advocate for a flexible curriculum that is adaptable to the interests of students (JIMÉNEZ et al., 2008; KABICHER et al., 2009; PEARSON, 2015; WILLIAMS et al., 2008). Thus promoting a vision that is not limited to the simple acquisition of basic knowledge (writing, reading, arithmetic, art, etc.), but also promotes learning experiences aimed at social skill development, problem solving, good work habits (self-sufficiency, responsibility, organization) and the capacity for reflection, critical thinking and initiative (EMIN-MARTINEZ; NEY, 2013; GARCÍA-VALCÁRCEL et al., 2013; SEGREDO et al., 2017).

#### 4.5 How to teach?

Didactics is one of the concerns of teachers, tutors and in general of the people in charge of teaching processes, who are constantly searching for strategies to harmonize teaching practices with the needs of society and the historical characteristics of the times. For this reason, it is not surprising that, in the last decade, research in education has focused on identifying new ways of teaching that go beyond the mere transmission of knowledge to reach a state where the generation of knowledge, supported by information and communication technologies, is valued.

In the research reviewed that explicitly addresses some type of teaching and learning strategy, 30% of the authors value collaborative work and emphasize the value of specific competencies in technology for sharing resources and learning cooperatively (SHARIJA; WATTERS, 2012; TAYLOR; DURAN, 2006; ; WARRIEM et al., 2014; WILLIAMS et al., 2008; ZHU, 2013; ZYAD, 2016). They also encourage self-direction and lifelong learning

(DREHER et al., 2009; MARTÍN; DE ARRIBA, 2017; POHL et al., 2008; et al., 2017; WEBB, 2006 ).

Furthermore, the use of ICT facilitates the redesign and combination of traditional materials with innovative multimedia resources (AREA-MOREIRA et al., 2016; KOH; SING, 2011; ONWUAGBOKE et al., 2015; SAXENA, 2017; THUNE; WELLE-STRAND, 2005) that can stimulate the development of skills such as critical thinking, problem-solving, communication and creativity (LIN, 2012; YUNUS, 2007; MARCOUX; LOERTSCHER, 2009; NIEMEL; HELEVIRTA, 2017). In addition, ICT presents options for serving students with special learning needs (McINERNEY, 2005).

#### **4.6 What, how and when to evaluate?**

The evaluation of learning is a major challenge for educational transformation in the 21st century. It is not enough to issue a quantitative value or a judgment at the end of a course. The function of an evaluation is to provide information at every moment in the teaching process. As discussed by Karmeshu et al. (2013), evaluation is a continuous event rather than a discrete one. It includes evaluation of learning at the beginning and at the end of the instruction (summative) as well as during the process (formative).

In this sense, the teacher's dialogue with the student regarding the learning evaluation (the shared evaluation) favours objective assessment and decision-making (ROMERO-MARTÍN et al., 2017). On the other hand, group self-evaluation is essential for a team to analyse its progress and errors as well as to identify the elements that must be changed to improve its collective performance (PEINADO et al., 2013).

Murthy et al. (2015) show how teachers manage to devise student-centred learning strategies but note some difficulties in aligning evaluation strategies. In this regard, Warien et al., (2014, p. 886) notes that the main idea of the model of "constructive alignment is achieved when the activities of learning, teaching and evaluation align with the expected results of student learning".

Other studies reviewed show how technology facilitates feedback processes and the development of strategies to advance students' capabilities through the systematization of information (DANI; KOENIG, 2008; DEANEY et al., 2006; LAGRANGE; ERDOGAN, 2009), educational games and evaluation rubrics.

The gamification methodology provides immediate feedback to students, allowing them to test hypotheses and learn from their actions (COUCEIRO et al., 2013), while rubrics establish criteria and standards by levels by providing scales that enable educators to determine the quality of student performance in specific tasks (VERA VÉLEZ, 2008).

Finally, Franklin and Smith (2015) identified the following key principles for the effective use of rubrics for performance evaluation: (1) clarify the assessment task; (2) enable regulation of planning of assignments; (3) produce work of better quality; (4) increase student confidence in undertaking the assessment task; (5) provide clear descriptions at each level of performance; (6) provide explicit learning outcomes; and (7) make grading fair and transparent.

## 5 Conclusions

Education and educational policies are linked to economic growth and the demands of society, and although changes happen slowly, in recent decades, the development of information and communication technologies has led the academic community to seek to transform schools and teaching strategies. Evidence of this can be found in the exponential growth in research studies related to the pedagogical integration of ICT.

The research design that dominates the literature reviewed in this study are case studies that further the understanding of the methodologies and strategies applied by some institutions to integrate technology into the educational process. This phenomenon results in strategies that were successful during implementation, but in few cases are sustainable over time.

It is important that the studies carried out on this subject, in addition to holistically considering all sectors and educational actors, be accompanied by a reflection based on the classical theories of learning and emerging theories of learning in the digital era. This allows to deepen the understanding of the factors that affect the success of the changes that are introduced in the school that seek to generate processes of educational transformation. In this regard, models such as TPACK, A2I, K20, and TDP, among others, give theoretical elements to the pedagogical integration of ICT and contribute in the consolidation of the transformation of education. Similarly, a number of alternative teaching strategies for stimulating innovation are beginning to gain momentum: e-learning, the flipped model, problem-based learning aided by technology, and game-based learning.

A concurrence in the aims of education was discovered in the literature review, concerning the training of independent, creative and innovative citizens to enable them to continue developing throughout life. However, only some studies refer to education about values and to the development of ethical citizens; skills necessary to achieve an integral formation of students, so that they perform with sensitivity and capacity for critical reflection and understanding of the globalized world and adapt quickly to changes.

Regarding the teacher's function, it continues to play a leading role in the process. Although the literature points to the student as the centre of the educational process, it is the teacher who decides what to teach, plans and designs the learning environments. To achieve a student-centred approach, a high level of student participation in the learning process is required, which implies that the teacher would have "low control". The teacher's role is therefore reduced to encouraging students to take the initiative to plan and complete learning activities. With a teacher-centred approach, the teacher prefers to assume responsibility for student performance by modelling learning activities and exemplifying a "high control" teaching behaviour (den Brok et al., 2004, referenced by Kale; Goh, 2014).

Regarding evaluation, the conclusions of studies that address this topic concur in favouring a formative, shared evaluation oriented towards improving learning and not only towards performance measurement of content domain. This is achieved through a process of verification, assessment and decision-making in order to optimize the teaching/learning process (Romero-Martín et al., 2017). In this process, ICT is a tool that allows the processing of large volumes of information from rubrics or portfolios and thus offers an immediate and timely feedback that allows clear information on the progress of students.

Finally, it is necessary to delve deeper into student-centred curricula, the evaluation of learning, learning assessment strategies, how to achieve education that is truly centred on the student, and the harmonization of emerging methodologies with traditional pedagogical approaches using current pedagogical principles. It is also important to investigate the mechanisms of participation of all educational actors in the formulation of strategies that allow changes to be made in order to achieve the training objectives.

## 6 Declarations

### 6.1 Availability of data and materials

Not to be shared. The main articles reviewed have been shown in the article.



## 6.2 Competing interests

Not applicable

## 6.3 Funding

This research is funded by Universidad de La Sabana

## 6.4 Authors' contributions

Both authors contributed equally

## 6.5 Acknowledgements

Not applicable

## 6.6 Authors' information

The authors are members of a research group interested in teacher training in ICT and have studies in this area.

## **Modelos para a integração pedagógica de tecnologias de informação e comunicação: uma revisão da literatura.**

### **Resumo**

*A educação foi, é e continuará a ser um campo cheio de questões: por que ensinar? O que ensinar? Como ensinar? O que, como e quando avaliar? Além disso, enquanto as mesmas questões persistem, as respostas a elas não. São dinâmicas e se transformam de acordo com as demandas da família, da empresa e das políticas governamentais. Para abordar estas considerações, este artigo tem como objetivo apresentar os resultados da pesquisa na literatura das últimas duas décadas sobre os elementos que caracterizam um modelo pedagógico e que foram levados em conta nas explorações sobre a integração educacional das tecnologias de informação e comunicação e identificar lacunas para pesquisas futuras. Os resultados mostram que apenas 11% da literatura consultada aborda as quatro questões listadas acima e conclui sobre a necessidade de aprofundar os fatores que afetam o sucesso das mudanças que são introduzidas na escola, que buscam gerar processos de transformação educacional, desde uma perspectiva holística*

**Palavras-chave:** Ensino. Modelos educativos. Tendências pedagógicas. Currículo. Avaliação.

## **Modelos para la integración pedagógica de las tecnologías de la información y la comunicación: una revisión de la literatura**

### **Resumen**

*La educación era, es y seguirá siendo un campo lleno de preguntas: ¿por qué enseñar? ¿Qué enseñar? ¿Cómo enseñar? ¿Qué, cómo y cuándo evaluar? Además, si bien las mismas preguntas persisten, las respuestas a ellas no. Son dinámicos y se transforman de acuerdo con las demandas de la familia, la empresa y las políticas del gobierno. Para abordar estas consideraciones, este artículo tiene como objetivo presentar los resultados de la investigación en la literatura de las últimas dos décadas sobre los elementos que caracterizan un modelo pedagógico y que se han tenido en cuenta en las exploraciones con respecto a la integración educativa de las tecnologías de información y comunicación e identificar las lagunas para futuras investigaciones. Los resultados muestran que solo el 11% de la literatura consultada aborda las cuatro preguntas enumeradas anteriormente, y se concluye sobre la necesidad de profundizar en los factores que inciden en el éxito de los cambios que se introducen en la escuela, que buscan generar procesos de transformación educativa, desde una perspectiva holística.*

**Palabras clave:** Docencia. Modelos educativos. Tendencias pedagógicas. Currículo. Evaluación.

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