

## Technology and methodology: the “MADE BY THEM TO THEM” approach in early childhood

**Paula Quadros-Flores**

paulaqflores@ese.ipp.pt

School of Education of Porto Polytechnic, Portugal

**Daniela Gonçalves**

daniela@esepf.pt

ESE de Paula Frassinetti, Portuga

**Altina Ramos**

altina@ie.uminho.pt

University of Minho, Portugal

### Abstract

Knowing that the Internet has opened doors to information and to the possibility of ubiquitous communication, there is now a need to review ways of teaching and learning. Learning to learn assumes a significant predominance in the methodological design due to the centrality of the student in the learning process. In this sense, this study aims to understand the approach “Made by them to them: the students in the learning process” in early childhood, assuming that it 1) activates prior knowledge; 2) promotes personal and collaborative efforts in the construction of the didactic resource; 3) creates emotion in the learning process. This is a multiple case study in different educational contexts and levels whose data collection was carried out by analyzing reflective narratives carried out by intern students from higher education institutions in public and private institutions. The results suggest that this approach, in addition to activating prior knowledge that is important for the construction of a robust structure of knowledge and significantly involving children in an emotional process of well-being, stimulates the natural articulation of knowledge in an inclusive environment. We conclude that situated and contextualized learning in a growing process of child involvement facilitates the understanding of reality and promotes inclusion and the construction of complex thoughts.

### Keywords

Pedagogical innovation; skills in the 21st century; education transformation

## I. Introduction

Today it is common to hear about a world in transition and how its unpredictability, complexity, diversity and interconnection causes challenges both personally and professionally. We know that in the context of education, it imposes a scenario of renewal and that the digital age encourages a set of strategies and new teaching resources, many linked to the internet, therefore to a digital environment, with the purpose of promoting communication and other solutions for current problems. We realize that this framework is not just a means to add to the traditional paradigm, as the new potentials raise the question of how to educate today, influencing the ways of teaching and learning to learn. In fact, in the current digital, global and ubiquitous world, Education has to respond both to the students' interests and to the challenges of society. The latter is increasingly organised around complex global digital networks based on updated notions of intelligent and sustainable growth and inclusion. Thus, it seeks to achieve a conceptual economy based on knowledge and innovation, on qualified human capital with a cooperative and entrepreneurial spirit. The notions of education and learning, in this context, take on a new meaning and a new amplitude because, as in other important times, education now assumes a strategic importance for the harmonious and integral development of the human being, enabling, in this way, a balanced and sustained growth of future societies, and for that there is a need to rethink the present to change the course and reimagine the future (Arendt, 1972; Nóvoa, 2009; UNESCO, 2021). The school must reaffirm itself as a space of social reference and educators/teachers must equip themselves with skills (Lucas M. & Moreira, A., 2017) that allow them to understand the fundamental lines of the processes of change that affect the world in general and, in particular, families and schools. In this way, educators/teachers assume themselves as active agents of change, as they occupy a privileged position to respond, with creativity, to the challenges that are posed to them daily. At the same time, in addition to being the main drivers of the transformation of the meaning of educational institutions and, within this scope, that of education and teaching concepts, they are fundamental actors in the task of the harmonious and integral development of each human being.

However, there are many authors, such as Nóvoa (2009), Azevedo (2016), Cabral and Alves (2018), Guerra (2018), who consider that the school does not respond to the needs of the new generation, which generates demotivation, at that there is a clear emergence of transformation. Several legal documents respond to this need, in terms of methodologies and teaching resources on the part of teachers, as training assumes a decisive role in the transition to a society and economy based on knowledge to which the curriculum has also been aligned (DL n. ° 396/2007; Order no. 214/2011; DL no. 79/2014, DL no. 55/2018). However, these guidelines for educational and pedagogical action are not a sufficient condition for the necessary transformations in the plans of school organization and pedagogical practices (Cabral & Matias Alves, 2018). Change requires a willingness to find the meaning of the new social contract for Education (UNESCO, 2021), the path towards the Future of education through sustainable collective futures. In this new scenario, social justice, respect for life, human and cultural dignity, and diversity assume a centrality that leads the student to contribute to the common good. In this context, the new curriculum (Oliveira-Martins et al. 2017; DL n. ° 55/2018) projects the student's profile in a humanist paradigm and emphasizes the curricular flexibility that fosters cooperation and solidarity. Understanding what we learn, why we learn, how and for what we learn responds to meanings that students often questioned and engages them both conceptually and procedurally.

Thus, this article, as part of the IFITIC project (Innovate with ICT in Initial Teacher Training to promote methodological renewal in Pre-School Education and in the 1st and 2nd Cycle of Basic Education) of the Center for Research and Innovation in Education (inED), intends to understand the implications of applying the approach "Made by them to them: The Students in the Learning Process" (AUTORES, 2019) in terms of cognition and affectivity in 1st grade students of the 1st Cycle of Basic Education. The study was applied by trainee teachers from two higher education

institutions, one public and the other private, in the Porto region, so it involves the opinion of these and two supervising teachers.

## II. Theoretical framework

Thanks to the internet, students have access to a vast array of novelties, both in terms of information and programs, software and apps, many of which are free and at the tip of their finger, which reveals that adapting to the current reality and preparation for a sustainable world requires skills that allow us to respond to complex challenges, mobilizing scientific, technical and technological knowledge and psychosocial resources that include attitudes, principles and values in a particular context (OECD, 2018a). Thus, for the critical understanding of the world, personal participation and conscious and responsible social intervention responds to the reference framework of the 21st century student profile, with a focus on critical thinking skills, flexibility, entrepreneurship and responsibility, among others such as global awareness, financial/economic and digital literacy supported by life and career skills that stimulate an autonomous student profile, with empathic and collaborative attitudes, entrepreneurial, resilient and with ethical and moral responsibility necessary to survive and thrive in a complex and connected world (Trilling & Fadel, 2009; Oliveira-Martins et al. 2017, OECD, 2018b). In cognitive terms, the ability for critical and creative thinking and problem solving is valued, being able to build knowledge from different sources using multimodal technologies to communicate them. The student profile also points to competences emerging from emotional and social capacities and values such as motivation, trust, respect for diversity, individual, local and global character. We are facing a paradigm of humanist tendency that is based on personality of the human being and emphasizes a scenario based on results and the logic of competences, which imposes strong changes in the teaching and learning process and in the varied use of digital pedagogical resources aligned with active methodologies based on challenge and problem solving. In this context, teacher training and creativity are vital, they are the ones who have to transform their pedagogical practices in order to adopt active, collaborative and problematizing methodologies, always centered on the student and their learning processes. In this sense, the European Framework for Citizens (Lucas & Moreira, 2017) and the European Framework for Educators (Lucas & Moreira, 2018) also respond as they must be equipped with the digital competence that all citizens need to actively participate in a digital society.

Within the scope of the IFITIC project, there was a need to renew methodologies to better respond to the interests of this new generation and society in general. In this sense, we focused on the approach "Made by them to them: The Students in the Learning Process" (AUTORES, 2019), an approach that is based on the assumption that the class must be prepared in advance by the student, that they, along with their colleagues, should produce teaching resources that will serve as learning in later moments. Note that prior knowledge is important for the learning process, as they enable knowledge schemes (Solé, 1999) related to representations of reality (Coll, 2002). When integrated at the beginning of the learning of a new content, they stimulate a coherent organization of thought, with meaning and meaning for the student, so they reflect the differences between students regarding the relationship with the studied content and the capacity for critical reflection, abstraction and connection of meanings, of creation. In this way, the memory and representative process of information is overcome, and the student, the agent of its discovery, carries important knowledge to share with peers. Thus, at first, it uses the Flipped Classroom approach, which activates previous knowledge and shows how students interact with knowledge outside the classroom and prepare important organizers in the bridges of knowledge, in addition to providing the teacher with the possibility to freeing them from presenting content and taking

advantage of class time for activities for discussion and construction of knowledge and pedagogical differentiation (Salvador, 2017). The same author considers that this inversion declines the unidirectional paradigm and promotes the reinforcement of classroom learning in a dynamic and satisfying work environment, promoting the development of competences, namely creativity and autonomy in the use of technological resources.

In the second class, of collective construction of resources that invites to revisit and mobilize the group's knowledge, the student's participation is engaging insofar as they are able to establish substantive relationships between what they learn from others and what they already know, making the process meaningful and enriched by the eyes of others. It should be noted that the new information is related to the individual's cognitive structure and is influenced by the affective moments he has experienced with representations of the individual's sensory experiences and facilitates subsequent learning (Ausubel, Novak & Hanesian, 1980).

In this sense, the scheme of the "Made by them to them" approach (Figure 1) is highlighted, which foresees an inverted process (Flipped Classroom) of construction of representations, in an informal environment that will feed the formal moments in the classroom, collaboratively and individually.

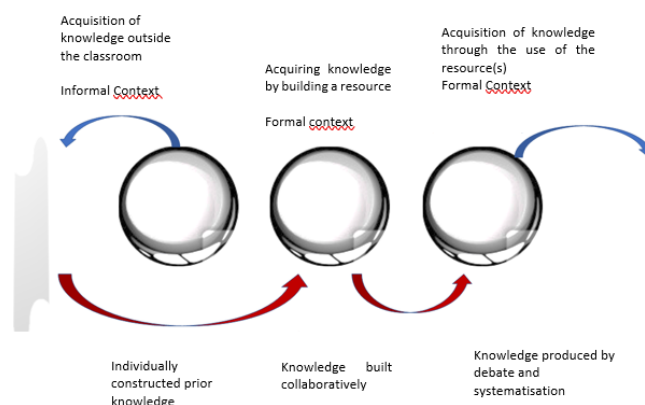


Figure. 1. T Methodological approach "Made by them to them" (own elaboration)

In a collaborative and inclusive way in the construction of resource(s) that involves all students, which makes the moment also emotional and conducive to the development of skills inherent to the student's Profile in the 21st century (Oliveira-Martins et al., 2017). Collaboration facilitates problem solving and encourages an integrated environment of efforts to achieve goals. It is, therefore, an articulated work, thought together and resulting from the interaction of knowledge and cognitive processes in collaboration (Roldão, 2007) that involves negotiation and decision in a learning focused on dialogue (Day, 2001) where the participants deepen and broaden knowledge (Wagner, 1997).

At the same time, and in a logic of inclusive education where everyone counts and has their own pace(s) and style(s) of learning, it is essential to implement a climate of trust and the development of meeting spaces in which learning is promoted effectively and as a team. Thus, the approach combines Flipped Classroom and Storytelling, starting from the centrality of the learning process, in a flexible, open and enriched curriculum approach, where "the teacher is the designer of learning experiences. They organize the content in the order that obtains greater student involvement,

negotiating times, modes and tools in a process placed at the service of integral development, lifelong learning and the passion for being alive and discovering oneself and the world at school (Calvo, 2016).” We believe, therefore, that all assessments can and should represent learning (Bona, 2017) and that this stage of educational intervention can and should respond to maximum personalization.

The third lesson uses as didactic resources the resources built by the students that serve as a basis and motivation for the discussion of the topic, recording of syntheses and evaluation. This process where products become learning processes again designs a cycle that optimizes a sustainable learning process and prolongs its retention time. In this context, the “Made by them to them” approach responds to Bloom’s taxonomy (Ferraz & Belhot, 2010), which highlights the organization of groups in the specific domain of cognitive, affective and psychomotor development of learners, emphasizing the student’s ability to domain of knowledge, behavior, attitude and physical abilities. This framework also reveals the issue of pedagogical differentiation insofar as learning differs from person to person, namely the level of depth and abstraction of knowledge. Thus, in terms of conclusion, the “Made by them to them” approach comprises the students’ previous knowledge and skills, respecting the previous organizers who make the necessary connections so that a certain content can be understood and applied. In this sense, it gives the opportunity to build cognitive processes according to the levels of complexity and objectives of cognitive development. These are developed in the following lessons, one in a collaborative way in the construction of resources and another in thematic exploration through dialogued, argued, reflected and analyzed discussion, in a meaningful learning environment, which ends in the group’s self and hetero-evaluation. It seems to us, therefore, that this approach integrates the categories of the cognitive domain proposed by Bloom’s Taxonomy (knowledge, understanding, application, analysis, synthesis and evaluation) and responds to training in line with the current curriculum and the student’s profile for the XXI century.

### **III. Methodology**

Methodologically, it is a multiple case study in different educational contexts and levels (Yin, 2015) that aims to understand the “Made by them to them” approach (AUTORES, 2019) in educational practices designed by future teachers of 1st Cycle of Basic Education. The study involved ten Intern teachers from two Higher Education Schools, one in the public sphere and the other private, in the Porto region. These trainee teachers taught in five schools of the 1st CEB, which involved around 110 children. Given the value of the evidence, the study has a qualitative approach, whose data collection was carried out by the analysis of reflective narratives produced by trainee professors from higher education institutions in public and private institutions, and also by field notes made by two supervising professors in the scope of direct observation in real context. Content analysis integrated the converging categories of the aforementioned study.

### **IV. Findings**

From the analysis of the narratives, several themes emerged. However, for this study we selected the three that best evidence Made by Them to them: a) Activates prior knowledge; b) Promotes personal and group efforts to achieve better results; and c) It creates emotion in the learning process, as it generates involvement, recognition of oneself and others. We justify below, with evidence transcribed from the data, each of these thematic categories. We do it, and each subject, first for primary school and then for higher education. The amount of evidence presented in each

case is related to the amount of work carried out, with two teachers involved in higher education and ten student teachers in primary school.

### **a. Activates prior knowledge**

The flipped classroom is part of a logic different from the organization of the class in the sense that students absorb knowledge in other informal and digital contexts and that these will benefit the learning process. It often supports project work methodology. [N3] "In class organization, students reflect on what they know, what they want to know, how they will learn, where and when. We reflect on what they know and want to know, so the guidelines for home are aimed at meeting the needs and difficulties and interests of each student". [N1] shows that "students have a first contact with the materials, or contents, that they will work on before class, considering this process as part of learning (...) since basic knowledge can be worked on prior to the class, with time in the classroom for more challenging and pedagogically rich activities". In the sense of preparing a didactic resource, [5] states that "I send video and sentences to observe the expressions of the characters and carry out readings to give voice to short films prepared in the classroom. It works a lot because they will record the readings in the classroom. The final video will be used in the class and when it is presented the children are happy to hear themselves in the figure of the characters". With regard to the effect, [N6] shows that "interest is immediately aroused, because contact with the proposal and its content allows for a real involvement with learning and broader, more meaningful and more felt associative judgments" If you have to resort to previous knowledge learned, or remembered before the class, it frees up class time for more cognitively demanding work. This idea appears in the diaries of more students, as can be seen in the following two examples: "a videocast was held with the students (...) an activity to take ownership and better understand the work they were going to carry out (...) This moment served, simultaneously, as a pre-reading moment, where previous knowledge was activated and which aroused motivation for reading and understanding the story... a relationship was established between textual comprehension and the reader's previous knowledge, allowing the construction of meaning" [N3]; "the children identified the verses they read the day before, starting to speculate about the application of their voices" (...) "This recognition of the lyrics immediately caught their attention, improving interactions and the quality of student participation" [N5]; "the fact that there was prior knowledge and learning of the contents, facilitated the development of the class, because the students were already truly connected with the theme and the different stages of the educational intervention" [N7]; "It is important to highlight the quality of student participation based on the activation of prior knowledge [N9].

With regards to the observation of supervising teachers, they underline the importance of activating prior knowledge to promote effective learning:

[NS1] "an educational practice not supported by prior knowledge is an exclusive practice and does not promote learning"; "the fact of sending a video, or, links, or guidance to deal with a topic at home, in its contextual reality, with the family and others, allows an individual look of the child on the topic, triggering their interests and relationships, at the same time. that generates opportunities for the development of knowledge, skills, attitudes and important emotions in the act of learning, promoting higher level learning, greater involvement and quality in participation, so there are positive effects on school results": "any teacher performs when seeing children working and smiling".

[NS2] "the approach used allowed a prior appropriation of the theme in a more intelligent way and with different associations, encouraging the development of several areas of competence highlighted in the Profile of students leaving compulsory education, namely:

Languages and Texts, Information and Communication, Critical and Creative Thinking, Interpersonal Relationships, Personal Development and Autonomy and Scientific, Technical and Technological Knowledge".

### **b. Promotes personal and group efforts to achieve better results**

The analysis of the narratives shows that there are factors that influence the effort made by children: it responds to need, difficulty and interest, so the practice is inclusive and promotes growth potential; the constructed resource has collective meaning; the environment is playful and happy; transdisciplinarity favors natural learning.

[N3] "the possibility for students to record their speech stimulated the improvement of reading; (...) the fact of being able to listen, reflect on their performance and even use the reading itself as a support for learning moments significantly increased learning, placing the student at the center of this process";

[N2] "As guidance responds to a need or interest, students engage at an individual level. But as they will also do group work to be discussed by everyone, they try harder, there is a positive competition".

[N10] "students have space and time to overcome their difficulties and work towards improving";

[N1] "work naturally and in a good environment";

[N2] "the time spent on autonomous exploration by the students, provided the creation of links between the contents addressed (...) the knowledge was built with the contribution of the students, which enriched the learning of each one and the others, in the group ";

[N5] "it aroused the interest of the class shown in carrying out the subsequent exercises, which improved the student's performance and school results";

[N8] "a school that believes in children, in their potential and in the conviction that school can and should be the starting point for a harmonious, balanced and happy growth, helping students to create mental frameworks, as well as constant participation directly in their learning based on autonomy and motivation".

With regards to supervising teachers

[NS1] "sharing the information resulting from the individual research with the group stimulated the child to make an effort to find news that would surprise his colleagues; it was also felt as a way of compensating the other elements for the research information received from the group. In addition, the presentation to the class of the products made as a group allowed overcoming some shyness and was leveraged by the stimulus of competition, as it stimulates the group to achieve better results compared to other groups, promoting greater involvement and effort by the group"

[NS2] "it is allowed to reconstruct ideas, to have space to think, because each student learns certain knowledge according to their own characteristics that come from their own knowledge, from their habits of thinking and acting, in addition to being possible to create moments of work/independent learning and other moments/interdependent learning, where everyone gains confidence, security and knowledge".

In summary, and in both cases, it appears that the prior preparation of the work to be carried out in the classes, when properly organized, motivates the children and this enthusiasm stimulates an increased effort in the task which has effects on the learning and development of competences.

**c. It creates emotion in the learning process, as it generates involvement, recognition of oneself and others**

There is no learning without emotion. In the voices of future teachers, it can be seen that enthusiasm, interactions, recognition, the climate of the classroom, favor concentration and the involvement fascinates and motivates.

[N1] "The children's previous involvement in the activities that were going to be developed throughout the class provided them with great enthusiasm, they anticipated what would follow, by recognizing one or another aspect or content that they identified as having been worked on previously (...) the fact that children get involved, even before class, with content and learning that would be covered in it, makes them more participatory and more fully committed to the success of their learning process, promoting a climate in the classroom more prone to the dynamization of more complex tasks and that reach higher levels of challenge";

[N3] "There was a greater concentration on the part of the children (...) full motivation and enthusiasm on the part of the children who were genuinely fascinated to see themselves on the other side of the screen (...) participated in the construction of resources, in this case the storytelling, which contained elements that trigger a predisposition for active participation in class, work that they will not easily forget"

[N5] "Managing emotions is not easy! Students like to recognize who is speaking, like to listen to themselves, self-evaluate and evaluate their peers, which constitutes a very enriching moment of reflection in this learning process"

[N7] "Bolívar (2010, p.17) argues that "collaborative work is based on the assumption that individuals learn better when they interact with colleagues", contemplating an added value with regard to the use of capacity and specialty of each teacher and using this potential to improve joint work. The multiple interactions, these multiple looks, these multiple ideas around the learning process are really necessary – This makes them learn and develop... and so do we".

The supervising teachers also reveal the importance of emotions provoked by situated, relational and inclusive learning.

[NS1] "the individual process creates the connection between the individual and the environment, so it generates emotions and helps the child to discover himself, the collaborative process stimulates emotions in communication and relationships. During the construction of the product, skills inherent to the profile of the 21st century student are mobilized and they interact with each other and there is a moment of inclusion, as everyone is prepared to share";

[NS2] "it is essential that (future) teachers understand the emotional dimension, which drives positive or negative learning, understanding that the student is an emotional being who thinks. In line with this new vision, it seems to us important that (future) teachers learn to interpret students' emotions, investing in an adequate pedagogical relationship. In



this context, we turn to Kickbush (2012) who advocated the vision of Learning for Well-being, emphasizing full respect for the child as a person and not as a means to any end, which implies the cultivation of their qualities, virtues and talent(s), integration and harmony. Sensitive to fostering learning opportunities in interaction and active involvement with the environment, the child's focus on the learning process suggests the development of new ways of working that support the interconnection between education and well-being on a basis of interaction and interdependence sustained in the learning environments. In this close interconnection between well-being and learning, the basic idea emerges that, in addition to an end, well-being, because it carries with it motivation, happiness, tranquility, informality, is naturally an enhancer and facilitator of learning. Learning is therefore central to well-being and well-being central to learning. This was the lived experience!"

## V. Conclusions

The proposal "Made by them to them: the students in the learning process" is an approach that sees the student as the main driver of their motivation and of their learning process, making them both producer and direct consumer of their production. The results show that the approach, in addition to activating previous knowledge, in a family environment, important for the construction of a robust structure of knowledge under knowledge schemes relevant to the construction of new knowledge, makes the learning process personalized, emotional and inclusive. Inclusive education promotes a school for all, giving everyone the opportunity to find their space in learning. This space was promoted at the time of collaborative construction of the product. Living together in diversity allows a natural look at an egalitarian learning process and the construction of group identity. Recognizing and recognizing yourself through a didactic resource built by you, adds value to relationships, trust and the learning process.

We conclude that situated and contextualized learning in a growing process of child involvement facilitates the understanding of reality and promotes inclusion and the construction of complex thoughts; that "Made by Them to Them" respects the child, facilitates the construction of relationships and skills and attitudes inherent to the profile of students in the 21st century.

## Acknowledgments

This work is funded by national funds through the FCT - Foundation for Science and Technology, I.P., under project UIDB/05198/2020 (Centre for Research and Innovation in Education, inED).

## References

- Arendt, H. (1972). *La crise de la culture*. Paris. Éditions Gallimard.
- Ausubel, D.; Novak, J., & HANESIAN, H. (1980). *Psicologia Educacional*. Interamericana.
- Azevedo, J. (2016). O nosso modelo escolar é do séc. XVIII e não está adaptado à realidade. *Entrevista ao Jornal de Notícias*, 25 de janeiro de 2016. [E-Reader Version]. Retrieved from <https://www.dn.pt/portugal/interior/o-nosso-modelo-escolar-e-do-sec-xviii-e-nao-esta-adaptado-a-realidade-4997445.html>
- Bolívar, A. (2010). El liderazgo educativo y su papel en la mejora: Una revisión actual de sus posibilidades y limitaciones. *Psicoperspectivas*, 9 (2), 9-33.
- Bona, C. (2017). *A nova escola*. Penguin Random House.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101.
- Cabral, I., & Matias Alves, J. (2018). *Inovação Pedagógica e mudança educativa – Da teoria à(s) prática(s)*. Faculdade da Educação e Psicologia da Universidade do Porto.
- Calvo, H. A. (2016). *Viagem à Escola do séc. XXI – Assim trabalhamos colégios mais inovadores do mundo*. Fundação Telefonica Vivo.
- Coll, C. *Aprendizagem escolar e construção de conhecimentos*. Artmed, 2002.
- Day, C. (2007). A Liderança e o impacto do Desenvolvimento Profissional Contínuo dos Professores. *Formação e Desenvolvimento profissional Docente: Perspetivas Europeia* (pp.30-39). Cadernos CIED.
- Decreto-Lei n.º 396/2007, de 31 de dezembro. Diário da República n.º 251/2007, Série I. Ministério do Trabalho e da Solidariedade Social. Estabelece o regime jurídico do Sistema Nacional de Qualificações (SNQ).
- Decreto-Lei n.º 55/2018, 6 de julho. *Diário da República*, 1.ª série - N.º 129. Ministério da Educação e Ciência. Estabelece o currículo dos ensinos básico e secundário e os princípios orientadores da avaliação das aprendizagens.
- Decreto-Lei nº 79/2014 de 19 de dezembro. Diário da República n.º 92/2014, Série I. Ministério da Educação e Ciência. Aprova o regime jurídico da habilitação profissional para a docência na educação pré-escolar e nos ensinos básico e secundário.
- Ferraz, A. P., & Belhot, R. (2010). Taxonomia de Bloom: revisão teórica e apresentação das adequações do instrumento para definição de objetivos instrucionais. *Gest. Prod*, 17(2),421-431. <https://doi.org/10.1590/S0104-530X2010000200015>.
- Guerra, M. A. (2018). Inovar o Morir. Cristina Palmeira e José Matias Alves (orgs.). *Escola e Mudança: construindo autonomias, flexibilidade e novas gramáticas de escolarização – desafios essenciais* (pp. 20-43). Universidade Católica Editora ISBN. 978-989-8835-54-3.
- Lopes, S., Gouveia L., & Reis, P. [2018]. *Experimento prático de uma aula sobre Diagramas de Classe (UML), com a utilização da metodologia da "sala de aula invertida* (Flipped Classroom). [E-Reader Version]. Retrieved from [https://bdigital.ufp.pt/bitstream/10284/6596/1/RI\\_tr\\_s\\_05\\_2018.pdf](https://bdigital.ufp.pt/bitstream/10284/6596/1/RI_tr_s_05_2018.pdf).
- Lucas M. & Moreira, A. (2017). *Quadro Europeu de Competência Digital para Cidadãos*. UA Editora – Universidade de Aveiro. ISBN: 978-972-789-525-0
- Lucas, M. & Moreira, A. (2018). *Quadro Europeu de Competência Digital para Educadores*. UA Editora – Universidade de Aveiro ISBN: 978-972-789-580-9
- Nóvoa, A. (2009). Educação 2021: para uma história do futuro. Universidade de Lisboa. [E-Reader Version]. Retrieved from [https://repositorio.ul.pt/bitstream/10451/670/1/21232\\_1681-5653\\_181-199.pdf](https://repositorio.ul.pt/bitstream/10451/670/1/21232_1681-5653_181-199.pdf)
- OCDE (2018). *Le Futur de l'éducation et des compétences, Projet Éducation 2030*. OCDE.
- OECD (2018), Skills Strategy Implementation Guidance for Portugal: Strengthening the Adult-Learning System, OECD Skills Studies, OECD Publishing. <http://dx.doi.org/10.1787/9789264298705-en>.

- Oliveira-Martins et al. (2017). *Perfil dos alunos à saída da escolaridade obrigatória*. República Portuguesa Ministério da Educação.
- Portaria nº 214/2011 de 30 de maio - Novas regras relativas aos dispositivos de qualificação e certificação pedagógica de formadores.
- Quadros-Flores, P.; Flores, A.; Ramos, A., & Peres, A. (2019). Made by them to them: The Students in the Learning Process. *International Conference New Perspectives in Science Education* (8th Edition) (pp. 417-423). Filodiritto Editor. DOI: 10.26352/D321\_2420-9732
- Roldão, M.C. (2007). Colaborar é preciso. *Noesis*, 71, 24-29. ME-DGIDC.
- Salvador, R. (2017). La Comunidad de Madrid apuesta por el modelo flipped classroom". *Especial Flipcon Spain'17 El valor de una idea la transforma en realidade* 3, 4-5.
- Solé, I. *Estratégias de leitura* (6ª ed.). Artmed, 1998.
- Trilling, B. & Fadel, C. (2009). *21st Century Skills: Learning for Life in Our Times*. Jossey-Bass.
- UNESCO (2021). *Reimagining our futures together: a new social contract for education*. UNESCO. ISBN 978-92-3-100478-0
- Wagner, J. (1997). The unavoidable intervention of educational research: A framework for reconsidering researcher-practitioner cooperation. *Educational Researcher*, 26(7), 13-22.
- Yin, R. K. (2015). *O estudo de caso*. Bookman.