

EDUCATIONAL TECHNOLOGIES IN BIOLOGY TEACHING: AN IMMERSIVE EXPERIENCE WITH 3D SOFTWARE

TECNOLOGIAS EDUCACIONAIS NO ENSINO DE BIOLOGIA: UMA EXPERIÊNCIA IMERSIVA COM SOFTWARE EM 3D

TECNOLOGÍAS EDUCATIVAS EN LA ENSEÑANZA DE LA BIOLOGÍA: UNA EXPERIENCIA INMERSIVA CON SOFTWARE 3D



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ABSTRACT

This article discusses the integration of Digital Technologies in the school context and briefly shares an experience of using P3D Software in Biology teaching. The theoretical support was based on studies by Amabis (2001), BNCC (2018), Costa (2004), Lévy (2005), Moita (2006 and 2007), among others. For data collection, bibliographic research and participant observation in the computer lab were used with the use of P3D Software in Biology classes with 9th-grade students. The study revealed that with the use of educational technologies, new ways of teaching and learning are emerging, ensuring that children and young people have their learning rights in relation to understanding, using, and creating with digital resources. The use of P3D Software made teaching more attractive and immersive. Students combined 3D images of the Human Body; Numerous possibilities exist for teaching content about the Human Body, aligned with the BNCC (Brazilian National Curriculum Base), which would not be possible in a traditional classroom setting based on linear text and images.

Keywords: Biology Teaching. 3D. Virtual Reality. Elementary School. BNCC.

RESUMO

O presente artigo discute a integração das Tecnologias Digitais no contexto escolar e compartilha, brevemente, uma experiência do uso do *Software P3D* no Ensino de Biologia. O suporte teórico teve embasamento nos estudos de Amabis (2001), BNCC(2018), Costa (2004) Lévy(2005), Moita (2006 e 2007) entre outros. Para a coleta dos dados, utilizou-se de pesquisa bibliográfica e a observações participante no laboratório de Informática com o uso do *Software P3D* nas aulas de Biologia, com alunos do 9º Ano do Ensino Fundamental. O estudo revelou que com o uso das tecnologias educacionais, novas formas de ensinar e aprender vão surgindo, garantindo que crianças e jovens tenham seus direitos de aprendizagem em relação à compreensão, utilização e criação com o uso de recursos digitais. O uso do *Software P3D* tornou o ensino mais atraente e imersivo. Os alunos realizaram combinação de imagens do Corpo Humano em 3D; inúmeras possibilidades de

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ensinar os conteúdos sobre o Corpo Humano, alinhado a BNCC que, em um espaço de sala de aula tradicional, baseado em texto e imagens lineares não seria possível.

Palavras-chave: Ensino de Biologia. 3D. Realidade Virtual. Ensino Fundamental. BNCC.

RESUMEN

Este artículo analiza la integración de las tecnologías digitales en el contexto escolar y comparte brevemente una experiencia con el uso del software P3D en la enseñanza de Biología. El fundamento teórico se basó en estudios de Amabis (2001), BNCC (2018), Costa (2004), Lévy (2005), Moita (2006 y 2007), entre otros. Para la recopilación de datos, se empleó la investigación bibliográfica y la observación participante en el laboratorio de informática, utilizando el software P3D en clases de Biología con estudiantes de 9.º grado. El estudio reveló que, con el uso de las tecnologías educativas, surgen nuevas formas de enseñanza y aprendizaje, garantizando que niños y jóvenes tengan derecho a aprender a comprender, usar y crear con recursos digitales. El uso del software P3D hizo la enseñanza más atractiva e inmersiva. Los estudiantes combinaron imágenes 3D del cuerpo humano; existen numerosas posibilidades para la enseñanza de contenidos sobre el cuerpo humano, alineados con la BNCC (Base Curricular Nacional Brasileña), lo cual no sería posible en un aula tradicional basada en texto lineal e imágenes.

Palabras clave: Enseñanza de Biología. 3D. Realidad Virtual. Escuela Primaria. BNCC.

1 INTRODUCTION

Web 2.0, in the mid-2000s, brought numerous ways of interaction and participation in different educational technologies: Platforms, applications, 3D and Virtual Reality software, among other systems, which has been radically modifying the conception and proposals of how digital resources can be used in teaching, of the various curricular components of Basic Education.

Today's students are part of a generation that communicates, shares and creates differently and has expectations of a more playful education connected with the real and virtual world. If before schools made computer labs available for students and teachers, today, as or more important than the technological infrastructure is how the school is organized for the effective use of technologies in the process of teaching and learning, that is, the pedagogical proposal, the training and the interest of teachers are integrated, aiming at the proper use of digital resources in the school. Whether teachers preferred to propose offline assignments, slideshows, or internet surveys.

Today, it is necessary to rethink the school infrastructure to receive educational technologies in their contexts and how teachers are reconfiguring the methodologies to use them to use them, aiming to develop the skills and competencies of students, because, much more than mere receivers of information, today's students want to create, feel and live new challenges in the classroom.

With the advent of the digital age, several educational technologies have been implemented in Basic Education schools to enhance teaching and learning, such as Virtual Reality laboratories, maker room with digital whiteboards and teacher training with the theme of the use of Artificial Intelligence (AI), it is seen that the way to use digital resources in school needs, increasingly, to be reflected in the different curricular components.

If before there were no clear objectives when using educational digital resources in the classroom, today teachers are required to have skills and proposals that can add value to student learning, as it is considered that, if used properly, they can be important resources to rethink the teaching and learning process at the most diverse levels of education.

Thus, this article seeks to reflect on the integration of Digital Technologies in the school context and to briefly share an experience of the use of P3D Software in Virtual Reality in the Teaching of Biology, with students of the 9th Grade - Elementary School.

2 FROM THE TRADITIONAL TO THE DIGITAL CURRICULUM: PATHS TO THE INTEGRATION OF EDUCATIONAL TECHNOLOGIES

In the scenario of great technological advances, the integration of educational technologies into the school context has become a requirement of contemporary education. For Basic Education, it is required to use and create technologies in a critical, meaningful, reflective and ethical way in the various social practices (including school ones) to communicate, access and disseminate information, to guarantee the right to learning and the development of cognitive potentialities.

According to the Ministry of Education (MEC), educational technologies are processes, tools, and materials that help education networks in the most diverse functions, from school management to the learning process in the classroom, including teacher training and inclusive education practices.

Therefore, educational technologies should be used in the classroom and, with them, more attractive classes should be proposed, which stimulate learning in a way that favors the search for information, analyzing, synthesizing and critically evaluating. It is necessary to encourage students to be protagonists of their learning and present them with learning challenges in the classroom, with interactive, collaborative and immersive resources, capable of providing them with an innovative way of thinking, acting, learning and making changes in the classroom.

In addition to enabling learning, the use of educational technologies validates what the BNCC provides. Both the main document, which brings "digital culture" as a general competency, and the complement that deals with the teaching of computing, clarify that students must develop skills related to the critical, reflective and ethical use of technological resources.

The National Common Curriculum Base (2018) provides that students need to develop general skills for digital culture using digital resources to learn and produce, use technological resources to design, develop, publish and present products (such as web pages, mobile applications and animations, for example) to demonstrate knowledge and solve problems. On the Digital World, the document explains the impact of technologies on people's lives and society, including social, cultural and commercial relations.

Thus, it is pertinent to ask: How to plan classes using digital technologies, so that they are truly integrated into curricular activities and that they are related to the competencies provided for by the BNCC?

To this question. Also, we find support in the BNCC, the document mentions that schools need to ensure the infrastructure to carry out activities related to the proposals. In

certain skills, especially those that appear in the Final Years, however, technological resources are required, such as devices with access to the internet and specific platforms. For teachers, it is the task of qualifying the use so that students make the best use of these resources.

The BNCC provides that in the Teaching of Natural Sciences, educational resources should be used to investigate and also as a means of producing information and knowledge: accessing, appreciating, producing, recording and sharing artistic practices and repertoires, in a reflective, ethical and responsible way. According to Silva (2012, p. 232) "in the classroom, the treatment given to learning content can be inspired by the construction of a network and not a route".

For Lévy (2005), it is not enough for the learner to appropriate technologies and their tools in an instrumental way, it is necessary to know how to deal with potential so that they can build knowledge and create innovative solutions. Therefore, it is understood that digital technologies are needed in the classroom in order to develop the student's interest in curricular content and mean advancement in learning.

The National Ten-Year Education Plan 2-2020 (PNE) highlights the relevance of the use of digital technologies as a pedagogical resource, at the different levels, spheres and dimensions of education, in order to encompass both students and teachers. Of the strategies, the following stand out:

7.6) Select, certify and disseminate educational technologies for primary and secondary education, ensuring the diversity of pedagogical methods and proposals, as well as monitoring the results in the education systems in which they are applied.

7.7) Foster the development of educational technologies and innovation of pedagogical practices in education systems, which ensure the improvement of school flow and student learning.

In this Plan, there are guidelines for teachers of Basic Education and different teaching modalities to rethink their daily pedagogical practices with the use of Digital Technologies, so that they use them for the production of knowledge. It is understood that:

The teacher needs to become aware of the movement of digital technologies in tune with the information society, with cyberculture and with the communicational profile of learners. These are less and less subservient to the univocal logic of mass media, when they operate more with the mouse, the touch screen, the movable and three-dimensional windows that allow more than merely looking and watching (SILVA, 2012, p. 254).

Therefore, it is important that teachers take ownership of educational resources and plan with intentionality in mind, so that they can provide "digital native" students with learning experiences consistent with their reality. This means that it is necessary to reflect on new ways of teaching for a generation that thinks and learns differently.

3 IMMERSIVE ENVIRONMENTS IN BIOLOGY TEACHING: AN EXPERIENCE REPORT WITH VIRTUAL REALITY AND 3D

The teaching of Natural Sciences in contemporary times needs to be considered as a collective, historical, contextualized, unfinished production, which develops through ruptures and scientific revolutions. However, in general, it is observed that the practice in the classroom and the resources used by teachers, for the most part, are textbooks, transcription on the blackboard and practices of memorizing texts and ready-made answers. It is observed that this type of teaching has left gaps in student learning.

An approach that associates theory and practice, values collective and meaningful practices, is dialogical and works with a procedural evaluation is still little present in this area of teaching. Amabis (2001) states that the difficulties in this area of knowledge are universal and that "the problem of current science teaching, in high school and elementary school, lies in the lack of a sense of direction, of a philosophical basis and the fact that teachers continue to teach as they were taught due to the lack of models" (AMABIS, 2001, on-line). Also for this author, it is expected that, in Natural Sciences and Biology classes, students make the articulation between the knowledge studied at school and everyday life.

Therefore, he judges meaningless an education based on the transmission of facts. It is necessary to prioritize interdisciplinarity, new proposals and new resources through which the student can understand how knowledge was built and how it can be changed.

Thus, here we report the use of the P3D educational software in the Biology classroom, with the 9th grade class of Elementary School. The objectives and contents proposed for the class were about the "Human Body (Human Skeleton)". The P3D Software was selected by the Biology teacher to use in the computers of the Computer Laboratory, an Image Projector and a digital whiteboard were also used to expand the contents covered. It should be said here that the teacher, before proposing the use of the software, had already selected and evaluated the resources he would use, intentionally, during three classes, with 50 minutes. The space chosen for the class with the use of the Software was the school's computer lab, where computers installed with the software and a digital whiteboard were available for presentations, if necessary.

The P3D educational software allows immersion in the contents of the curricular components of Biology, Science, Chemistry and Geography in Virtual Reality, with 3D elements. As this is the students' first contact with the P3D Software, the initial step was the presentation of a Software tutorial, undoubtedly an important moment for students to be motivated to create, research and interact through the new digital resource, as can be seen at the address <http://www.p3d.com.br/>.

It is worth mentioning here that the students had no difficulties in finding the resources, they explored the software in an intuitive way, with each discovery they interacted with the teacher, making connections with what they already knew about the content and with the new knowledge acquired with the exploration of the Software. As Silva (2012, p. 225) well expresses, "in digital art, the conception of the artist's authorship is the same. Starting with the digital image itself, understood as a field of dialogical possibility of immersion, navigation...".

In the second class, with the use of the P3D Software, the proposal for the study was to take a "journey through the human body", enabling a truly playful class in a Virtual Reality scenario, an immersive, personalized experience without the need for 3D glasses. It should be noted that the P3D Software does not require glasses for immersion in the Virtual elements. The Virtual Reality simulation is presented on the screen in power, with images and movements of virtualization in power.

Valente (2013, p.40) highlights the importance of the use of digital resources integrated into the curricular components, as "many phenomena can be simulated, allowing the development of activities or the creation of a "world of make-believe" where certain activities are not possible to be developed in the real world". For the Teaching of Biology, Virtual Reality enabled different simulations of the Human Body, which enhanced the Teaching and learning of the proposed contents.

In the third and last meeting, students and teacher observed and discussed the importance of the rib cage, muscles, vital organs, among other abstract concepts that, in a traditional classroom space, based on text and linear image of the textbook would not be possible. A singular moment of immersion. With the use of Virtual Reality: interaction, navigation and immersion in a three-dimensional environment generated by the computer, through multisensory channels of vision, hearing, touch, smell or taste, in Biology classes.

Therefore, it is believed that the benefits offered by the use of 3D in school come from the intuitive knowledge that this resource can provide to the student about the physical world, which can be used to manipulate information and concepts through experiences close to

reality. This is because, in the virtual environment, it is possible to create the illusion of a world that, in reality, does not exist, through 3D representation.

4 EDUCATIONAL SOFTWARE AND VIRTUAL REALITY: CONCEPTUAL BASES FOR CONTEMPORARY TEACHING

The technological impulse, the convergence of media, Virtual Reality and 3D models have made educational software increasingly sophisticated. For the school context, the use of this resource can mean a new design in teaching and enable students to have new learning experiences through simulation, immersion, animation, among other functions.

For Gomes (2015), educational software, from the user's perspective, is a resource developed to assist the teaching and learning process of curricular activities in the most diverse areas of knowledge, which can be explored according to the interest of each student or, specifically, enable the process of teaching and learning a specific subject.

Ramos (2013) asserts that educational software can be defined as a digital resource produced specifically for the purpose of supporting teaching and learning. The author adds that, with this resource, whose elements allow modeling, simulation, animation and multimedia combination, among other functions, teaching strategies and different modes of learning can be created, that is, the integration and use of these resources in the classroom can place students and teachers in front of experiences that are impossible to carry out through traditional resources. Especially when the choice of teachers falls on educational software.

Costa & Oliveira (2004) conceptualize educational software as "that type of program developed especially for teaching activities, with the main objective of allowing students to develop the learning of certain content" (COSTA; OLIVEIRA, 2004, p. 125). Therefore, it is understood that educational software is a digital resource developed for the teaching and learning process that can contribute to a new teaching design, help the understanding of the contents in the most different subjects of the curriculum and promote motivation and new learning in the classroom.

For Gomes (2015), the use of educational software in the teaching and learning process can contribute to promoting the cognitive development of users, with an impact on the learning of certain conceptual fields. Such resources can represent excellent learning possibilities, in addition to serving to rethink the process of teaching and learning.

Ramos (2013) also defends the use of educational software in the classroom by teachers and students, emphasizing that they can significantly influence learning because they have concepts and theories that the textbook does not have. Moreover, these concepts

and theories can be assimilated in an authentic and non-linear way. Also for this author, the use of digital resources requires a pedagogical approach different from the traditional teaching approach, which allows for the proper exploration of the functions and properties of the resource, in terms of task, activities and experiences provided to students, removing from these work proposals "something" that would not be possible without access to and use of this type of resource (RAMOS, 2002, p. 101).

Thus, the way in which the software is used in pedagogical practice needs to be associated with the pedagogical intentionality and the technical characteristics of the software. The author also considers that an innovative digital educational resource

a) it contains clear educational intentionality, associated with the curriculum; b) It incorporates approaches, both at the design level (exploring computational characteristics) and at the pedagogical level (integrating a specific approach to the teaching and learning process within the resource), providing modes of unique learning experiences, arising from computational possibilities, in relation to the knowledge, content or process to which it relates; c) It requires the active involvement of the student in the proposed didactic activities through the use of the functions and internal properties, proper to the resource (RAMOS, 2013, p.102).

Thus, for educational software to truly act as resources that can reconfigure the teaching and learning process, it is necessary that teachers, before using them, establish "[...] precise pedagogical criteria and objectives, based on learning theories, in the same way as with materials in the form of video and television and radio broadcasts" (GOMES, 2015, p. 73).

In this understanding, teachers need to know the characteristics of the software and know how to select them, as well as evaluate them according to the pedagogical objectives they intend to achieve. It is necessary to define when, how, under what circumstances and what learning objectives students can achieve, in terms of knowledge of the contents or in terms of skills that they may acquire through the exploration and use of this software (RAMOS, 2013, p. 106).

Valente (1998) and Vieira (1999) propose categories according to the pedagogical objectives of the educational software, namely: tutorials, exercises and practices, educational games, simulation and modeling.

In this study, the educational software of the type "simulations" in 3D stands out, which provides users with a virtual visualization of real situations, in which it is possible to explore and manipulate objects through various angles and perspectives. The use of resources with 3D technology - educational software, games and others - can be efficient, especially in the

teaching of abstract content, since, through experiments and simulations, students are guided to articulate theory and practice.

Moita (2006) states that the simulation present in interactive images in virtual reality and in different screens, promotes the interaction and manipulation of objects or scenes, as well as the examination of them, from all points of view. In line with this author, Ramos (2013) emphasizes the importance of using educational software created and developed through simulation, since they correspond to "advanced forms of knowledge representations, which have evolved thanks to scientific and technological advances (which continue to evolve) and which are accessible to teachers and students" (RAMOS, 2013, p. 106).

Therefore, simulation software can mean an effective help in student learning by bringing complex solution challenges. In addition, they boost motivation and curiosity, build a new perspective on problem-solving and can develop cognitive potential, indispensable elements of active learning. Examples include software developed based on Virtual Reality (VR) for the exploration and visualization of three-dimensional images, object manipulation, animations, creation of texts, images and videos, among other applications, such as the educational software P3D, which is the object of research in this study.

One can then dare to propose a new category of educational software: Educational Software in VR. This type of educational software allows students and teachers to visualize, explore and study concepts from the various areas of the curriculum through three-dimensional (3D) imaging. It is an educational digital resource equipped with tools that enable the teaching and learning of school content through simulation and experimentation.

The use of educational software in VR can significantly alter teaching practice and encourage students to interpret abstract content, which is usually not understood when using traditional resources such as textbooks, printed activities, drawings on the board or even the lecture. According to this conception, the integration of this type of software in the school context needs to be accompanied by concrete training of teachers, so that they can use them effectively and create didactic situations in which students can explore them, making new discoveries about the contents studied.

The way in which educational software is produced, its characteristics and its objectives also play an important role in the insertion in the school and in the adherence of teachers to use it in the classroom. The interface, immersion, interaction, challenges, fun, motivation, ease of navigation, intuition, and pedagogical proposal are characteristics that can make these software more attractive to students and teachers.

RAMOS (2013, p. 110) consider the existence of several levels of sophistication in the processes of creating digital educational resources, including: a) the mechanical level, b) the creative level and c) the design level.

The mechanical level refers to the use of elementary processes such as copying and pasting an image onto a web page, crafting a graphic to present, and recording a video interview for use on the platform.

The creative level refers to the use of processes that require a considerable level of technical and artistic mastery and general skills in the production of a resource, in addition to curricular knowledge, but that do not imply detailed planning.

The design level requires several steps in a complex planning process, ranging from the analysis of the needs of a group of recipients to the design of student interactions, as well as the material and devices for evaluating progress, among other aspects, in order to achieve the planned objectives.

Valente (1998) and Vieira (1999) also point out that the design of software needs to be connected to pedagogical objectives. They classify educational software according to the way they learn:

Sequential – its main objective is to present content to students and stimulate memorization, in a process of stimulation and response. In this case, the student is passive.

Relational – It is focused on the acquisition of certain skills and contributes to the student establishing relationships with other facts or other sources of information. The emphasis is given to the student, and learning is only processed with the student's interaction with technology;

Creative – Stimulates the creation of new mental schemes and favors the interaction between the teacher, the student and the technology. In this type of software, the process of sharing and collaboration between the subjects and immersion and creation in a learning context prevail. Students and teachers go through an active teaching and learning process, which favors changes in practice and in the way of learning.

For Gee (2009), the contemporary theory of learning deals with subjects learning from their experiences and, based on them, storing them in memory and using them to generate simulations that facilitate the formulation of hypotheses for the resolution of future problems in different contexts. The author asserts that good electronic games convey good learning principles. In addition, the challenge and learning are, in large part, what makes video games motivating and fun.

Thus, it is understood that educational software also needs to incorporate good characteristics and pedagogical intentionality, allowing students to develop good learning.

From this perspective, teachers need to be aware of the principles and characteristics of educational software for good results in the teaching and learning process, since, when used, this resource needs to work to encourage the student to think, create and socialize. It is the student who builds and maintains an interactional and active relationship with the software, seeking to discover the concepts and theories of the area of study proposed by the teacher.

Gee (2009) presents some learning principles that good games incorporate and that educational software should also incorporate as a way to make content learning more effective, which are transcribed below:

- **Identity:** No deep learning occurs if learners don't make a long-term commitment to it. Learning something in a new field, whether physics or carpentry, requires the learner to take on a new identity: a commitment to see and value the work and the world the way good physicists and carpenters do. Good video games captivate players through identity.
- **Interaction:** In a good game, words and deeds are placed in the context of an interactive relationship between the player and the world. Thus, in school, texts and books also need to be placed in contexts of interaction that the world and other people respond to.
- **Production:** Players are producers, not just consumers; they are "writers," not just "readers." Even at the simplest level, they co-design games by the actions they perform and the decisions they make. They help "write" the worlds they live in – at school, they should help "write" the field and curriculum they study.
- **Risks:** Good video games reduce the consequences of players' failures; when they get it wrong, they can always go back to the last game they saved. They are thus encouraged to take risks, to explore, to try new things. Games encourage players to take a different attitude, to explore in detail before going forward too quickly, to think laterally and not just linearly, and to use that exploration.

Smart tools and distributed knowledge: The virtual character or characters that one manipulates in a video game – and many aspects of the gaming world – are, in fact, "smart tools". Virtual characters have their own skills and knowledge that they lend to the player. The core knowledge needed to play the game is distributed among a set of real people and their clever virtual characters. Smart tools and distributed knowledge are key aspects in modern professions, although they are not always so in modern schools.

Cross-functional teams: Each player must master his or her own specialty (role), because a Mage plays very differently from a Warrior, but understands enough of the specialties of others to integrate and coordinate with them (cross-functional understanding). Moreover, in such teams, people join according to their commitment to a common mission, not primarily on the basis of race, class, ethnicity, or gender.

Performance prior to competence: players can perform before they are competent, supported by game design, the "smart tools" offered by the game, and often the support of other more advanced players (GEE, 2009, p. 03).

Some of these principles presented by the author could be applied in schools through the use of software, games, applications, among other systems, which would make learning more challenging, dynamic, and meaningful.

It should be emphasized, however, that teachers need to mobilize their knowledge and skills in order to enhance the use of such resources to ensure positive impacts in the classroom and promote the cognitive development of students. The importance of the teacher to create appropriate strategies is emphasized, aiming to achieve the objectives and evaluate the results in the teaching and learning process with the use of such resources.

The use of educational software with a 3D interface is a resource that can open ways for teachers to explore the cognitive potential of students and favor active, creative, immersive learning, in which the student will be able to experience new ways of understanding abstract content in a differentiated and pleasant way. "The best learning is the one that is understood and gives pleasure. Children love to learn even when they are taught with a different logic" (PAPERT, 1996, p. 83).

The use of educational software can stimulate human cognitive capacity and represent changes in the teaching and learning process when based on a flexible, dialogical and provocative proposal of the teacher, because, more than ever, he is impregnated with cultural significance (MOITA, 2007).

When referring to the use of 3D educational software in school contexts, it is imagined that they should bring in their conception an educational paradigm through which students can learn through exploration, simulation, construction and creation, taking advantage of the properties and potentialities that these resources offer for creation, co-creation and knowledge of the world.

5 FINAL CONSIDERATIONS

More than choosing which digital resource to use, it is necessary to define pedagogical intentionality, that is, to know what the objective is and how the technology will contribute to

the teaching and learning process, and how it will be used. With the educational technology defined, it is time to evaluate what the contributions are, think about the pedagogical objectives, reflecting on how technologies can enhance learning, whether in Biology, Science, Chemistry, among other curricular components.

Thus, the challenge that is posed is to stimulate the critical and reflective use of educational technologies integrated into the school curriculum, as an enhancer of teaching and new learning.

It is argued that teachers, in the digital age, are creative and that their classroom is attractive, interactive and capable of enabling transformations in teaching and learning. Tapscott (2010) suggests some strategies for pedagogical practice with educational technologies. This author recommends that one cannot just bring technologies to the classroom and expect good results: it is necessary to focus on the paradigm shift that these resources can promote. Therefore, it is necessary to use technologies to create a student-centered, customized and collaborative education environment, promote interactive classes to the detriment of expository ones and maintain a critical and reflective look at the entire process, giving voice to students and stimulating group work.

The contemporary educational context requires plural educational practices that enhance the teaching and learning process and maximize the quality of teaching in order to provide a more active, dynamic and varied learning, privileging research, interaction and personalization in multiple spaces and face-to-face and virtual times.

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