P3D SOFTWARE AS A RESOURCE FOR RETHINKING THE PRACTICE OF TEACHING AND LEARNING SCIENCE

O SOFTWARE P3D COMO RECURSO PARA REPENSAR A PRÁTICA DE ENSINAR E APRENDER CIÊNCIAS

EL SOFTWARE P3D COMO RECURSO PARA REPENSAR LA PRÁCTICA DE LA ENSEÑANZA Y EL APRENDIZAJE DE LAS CIENCIAS

https://doi.org/10.56238/sevened2026.008-029

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ABSTRACT

This article presents an excerpt from the dissertation "P3D Software as a Resource for Rethinking the Practice of Teaching and Learning Science," a research project that aimed to analyze the impact of P3D software on science education with 8th-grade students. This excerpt, of a bibliographical nature, briefly discusses teacher training and the use of digital technologies in the classroom: 3D technology, Virtual Reality (VR), also considering the presence of Artificial Intelligence (AI), which is no longer a distant reality or restricted to science fiction and is increasingly present in our lives – including in education. For science education, digital technologies can make teaching playful and awaken students' interest in learning. The theoretical framework draws on studies by Lévy (1999, 2004), Veen & Vrakking (2009), Silva (2012), Moita (2006, 2007, 2013), Amabis (2001), among others. The study revealed that the use of Virtual Reality and 3D technologies improved student participation, engagement, and performance in science classes. For students, exploring the three-dimensional (3D) environment enabled a meaningful, reflective, and ethical use of available resources. The research resulted in an interactive teaching sequence (ITS) focused on science education, using three-dimensional (3D) digital resources in pedagogical practice.

Keywords: Educational Technology. 3D. Teacher Training. Science Teaching and Learning. Elementary Education.

RESUMO

O presente artigo traz um recorte da dissertação “O Software P3D como recurso para repensar a prática de ensinar e aprender Ciências”, pesquisa que teve como objetivo analisar o impacto do Software P3D no ensino de Ciências, com estudantes do 8º Ano do Ensino Fundamental. Neste recorte, o objetivo deste estudo, de natureza bibliográfica, foi discutir, brevemente, a formação dos professores e o uso das tecnologias Digitais em sala de aula: Tecnologia 3D, Realidade Virtual (VR), considerando, também, a presença da Inteligência Artificial (IA) que deixou de ser uma realidade distante ou restrita à ficção científica e está cada vez mais presente em nossas vidas – inclusive na educação. Para o ensino de

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Ciências, as tecnologias digitais podem tornar o ensino lúdico e despertar no aluno interesse por aprender. Toma-se como aporte teórico estudos de Lévy (1999, 2004), Veen & Vrakking (2009), Silva (2012,), Moita (2006, 2007, 2013), Amabis (2001), entre outros. O estudo revelou que o uso dos Tecnologias em Realidade Virtual e 3D melhorou a participação, o engajamento e o rendimento dos alunos nas aulas de Ciências. Para os alunos, a exploração do ambiente em três dimensões (3D) possibilitou um uso significativo, reflexivo e ético dos recursos disponíveis. A pesquisa realizada obteve como produto uma sequência didática interativa (SDI) voltada para o ensino de Ciências, quando da utilização de recursos digitais em três dimensões (3D) na prática pedagógica.

Palavras-chave: Tecnologia Educacional. 3D. Formação de Professor. Ensino e Aprendizagem de Ciências. Ensino Fundamental.

RESUMEN

Este artículo presenta un extracto de la tesis "Software P3D como recurso para repensar la práctica de la enseñanza y el aprendizaje de las ciencias", un proyecto de investigación que tuvo como objetivo analizar el impacto del software P3D en la educación científica con estudiantes de octavo grado. Este extracto, de carácter bibliográfico, aborda brevemente la formación docente y el uso de tecnologías digitales en el aula: tecnología 3D, realidad virtual (RV), considerando también la presencia de la Inteligencia Artificial (IA), que ya no es una realidad lejana ni se limita a la ciencia ficción, sino que está cada vez más presente en nuestras vidas, incluyendo la educación. Para la educación científica, las tecnologías digitales pueden hacer que la enseñanza sea lúdica y despertar el interés del alumnado por el aprendizaje. El marco teórico se basa en estudios de Lévy (1999, 2004), Veen y Vrakking (2009), Silva (2012), Moita (2006, 2007, 2013) y Amabis (2001), entre otros. El estudio reveló que el uso de la realidad virtual y las tecnologías 3D mejoró la participación, el compromiso y el rendimiento del alumnado en las clases de ciencias. Para los estudiantes, explorar el entorno tridimensional (3D) les permitió un uso significativo, reflexivo y ético de los recursos disponibles. La investigación dio como resultado una secuencia didáctica interactiva (SDI) centrada en la educación científica, que utiliza recursos digitales tridimensionales (3D) en la práctica pedagógica.

Palabras clave: Tecnología Educativa. 3D. Formación del Profesorado. Enseñanza y Aprendizaje de las Ciencias. Educación Primaria.

1 INTRODUCTION

Digital technologies have increasingly given rise to an immersive and revolutionary digital future. The meeting of Virtual Reality (VR) and Artificial Intelligence (AI) are innovations that come together to create more intelligent, dynamic and personalized immersive experiences, configuring new contexts for education.

This new digital educational context, revolutionary, contrasts with traditional teaching practices and with the notion of students' passivity, which denotes the need to rethink the school, the pedagogical practice and the resources used in the classroom. Digital technologies - henceforth treated as digital resources - bring a new behavior and a new way of learning for students and suggest to teachers the innovation of teaching.

Instead of teaching only lectures, teachers are required to propose challenges and projects through digital resources in the classroom, such as AI in education, which has been offering the possibility of more personalized, flexible, inclusive, and engaging learning. In addition, the tools provide information not only about what is being learned, but also how it is being learned and how students are feeling.

It is not intended here to deny the value of traditional resources - textbooks and paradidactics, notebooks, board games, among others - however, it is warned that the young people of this generation grew up surrounded by computers and yearn for more interactive resources at school.

It should be noted that students already arrive at school with digital skills and a different way of thinking, acting and learning. This new student profile can help the teacher to propose a new lesson design. However, this does not mean that teachers will be guided by students, but will rethink their methodologies, strategies, and resources to mediate, investigate, and coordinate their actions through digital resources that are part of their daily lives.

2 THEORETICAL FRAMEWORK

2.1 DIGITAL TECHNOLOGIES IN EDUCATION

We are experiencing the digital revolution and profound transformations happen in a fraction of seconds in the most diverse sectors of society. For education, sophisticated digital resources are suggested – Web 2.0, 3D elements, virtual reality software, among other applications – that bring a new way of expressing and communicating, of combining sounds, images, texts through Artificial Intelligence (AI), which means a new cultural context, through which new ways of interacting, thinking, teaching and learning.

The school, immersed in this context, more than ever needs to rethink its educational processes and practices, since the traditional conceptions of teaching, historically crystallized

in the classroom, no longer meet the demands of the digital society. According to Veen & Vrakking (2009, p. 13), "the problem is that schools still try to transfer knowledge as they did 100 years ago. This would not be a problem if the entire economic structure of our society were still the same, but that is not the case."

For Silva (2012, p. 84), the school has not yet understood the importance of positioning itself in a positive way in the face of the digital revolution, since it is "alien to the "spirit of the time" and remains closed in on itself, in its transmission rituals, when its surroundings are fundamentally modified in a new communicational dimension".

Also for this author, the school needs to consider the new digital experiences lived by students, as they are the new active spectators, who deal with the flow of information and know how to manipulate images on increasingly less static screens.

From this perspective, the integration of digital resources in the classroom can mean important challenges for teachers and present students with new learning experiences. For Lévy (1999), the school and teachers need to recognize the new virtual spaces as a place for the creation and acquisition of knowledge. The author calls these spaces cyberspace, defined as a "new space of communication, sociability, organization and transaction, but also the new market of information and knowledge" (LÉVY, 1999, p. 167).

Also for this author, cyberspace presents itself as one of the privileged instruments of collective intelligence, due to the multiple possibilities of interaction, participation, sharing and organization of knowledge, in the face of which the transmissive processes of content start to give way to non-linear processes, through interaction, collaboration, co-creation and participation.

From this collective construction of knowledge, which forms a global memory made possible by cyberspace, a new culture emerges, cyberculture. According to the author, the emergence of this new culture leads to a reconfiguration in the world of work and affects educational systems.

Cyberspace (which I will also call "network") is the new means of communication that arises from the worldwide interconnection of computers. The term specifies not only the material infrastructure of digital communication, but also the oceanic universe of information that it houses, as well as the human beings who navigate and feed this universe. As for the neologism "cyberculture", it specifies here the set of techniques (material and intellectual), practices, attitudes, ways of thinking and values that develop along with the growth of cyberspace (LÉVY, 1999, p. 17).

This author adds that it is unprecedented in the history of humanity to find that most of the skills acquired by a person at the beginning of his professional career will be obsolete at

the end of his career. Working means, increasingly, learning, transmitting knowledge and producing knowledge. Cyberspace supports intellectual technologies that amplify, externalize, and modify numerous human cognitive functions: memory (databases, hyperdocuments, digital archives of all kinds), imagination (simulations), perception (digital sensors, telepresence, virtual realities), reasoning (artificial intelligence, modeling of complex phenomena).

For Lemos (2010, p. 88), cyberculture is the "social and cultural product of the synergy between contemporary aesthetic sociality [...] and new technologies". Therefore, new human relationships mediated by technologies generate new values, behaviors, attitudes, culture and new expectations regarding school and teaching.

The impact of cyberculture imposes new educational models on schools and new strategies and methodologies on teachers, as it is argued that, in the face of this new cultural context, students should also be encouraged to think, develop new skills and solve problems through digital resources. Thus, it can be said that the contemporary school is intensely experiencing the challenge of integrating digital resources into its context, so that they add value to student learning. According to Lévy (2004), technological resources are particularly suited to educational uses. The fundamental role of the student's personal involvement in the learning process is well known. The more actively a person participates in the acquisition of knowledge, the more he will integrate and retain what he learns. Now, interactive multimedia, thanks to its reticular or non-linear dimension, favors an exploratory, or even playful, attitude towards the material to be assimilated. It is, therefore, an instrument well adapted to an active pedagogy (LÉVY, 2004, p. 24).

In this understanding, the use of digital resources in the classroom is defended, based on active, motivating, fun, participatory strategies and methodologies that, in addition, can have a greater impact on cognitive potential. The most important thing is not to insert digital resources in the school, because the way they are used can drive new transformations in the teaching and learning process.

Thus, Lévy (1999, p. 158) argues:

> What needs to be learned can no longer be planned or precisely defined in advance [...]. We must build new models of the knowledge space. Instead of representation on linear and parallel scales, in pyramids structured in "levels", organized by the notion of prerequisites and converging towards "higher" knowledge, from now on we must prefer the image in emerging, open, continuous, flowing, non-linear spaces of knowledge, reorganizing themselves according to objectives or contexts, in which each one occupies a unique and evolving position.

Still for this author, it is necessary to learn from the movement of techniques. This

means that this movement, first of all, is equivalent to learning to deal with the potential of digital technologies and knowing how to take advantage of the communicational, interactive and collective construction power that they enable. In this context, the teacher needs to become an animator of collective intelligence in the classroom instead of a transmitter of knowledge.

For Lévy (2003), collective intelligence is that constructed by subjects in a collective way, which can be shared and not limited to a privileged few. For this reason, the author states that collective intelligence should be potentially valued and based on practical actions. These, in turn, are intended to mobilize the competencies of individuals who seek, in fact, the basis and objective of collective intelligence, namely: the recognition and mutual enrichment of those who are involved with this proposal.

Jenkins (2009), when dealing with collective intelligence, asserts that "none of us can know everything; each of us knows something; and we can put the pieces together, if we combine our resources and unite our skills" (JENKINS, 2009, p. 28). He deals with the impacts arising from web 2.0 (new communicational contexts, different programs and systems) and calls this process of communicational change the culture of convergence. It also draws attention to the fact that convergence does not occur through electronic machines, however sophisticated they may be, but in the subjects' brains individually and in their social interactions with others.

For education, it can be said that the convergence of media brings information through sophisticated platforms, software, applications, Artificial Intelligence, among other resources, so that students can relate, interact and make new connections with the world.

It is understood that it is necessary in the school to work with a collectively constructed "web", which may mean new teaching and learning processes, changes in methodological strategies and the emergence of new partnerships and challenges inside and outside the classroom and, consequently, new conceptions of teaching and learning from the mediation of information and communication technologies. With such technologies, the knowledge of individuals can be connected.

2.2 DIGITAL EDUCATIONAL RESOURCES: SOME CONCEPTS

The technological revolution brought the convergence of the media. Images, sounds and videos are integrated and sophisticated resources emerge: Virtual Reality (VR) and Three Dimensions (3D) and finally Artificial Intelligence (AI).

For Lévy (1999, p.110) "virtualization is complex, problematic, the knot of tendencies or forces that accompanies a situation, an event, an object or any entity, and that calls a

process of resolution, updating". This means that the virtual should no longer be seen as a way of being, but as a dynamic, as something that exists in potentiality.

Still for Lévy (1996), the real and the virtual cannot be understood as opposite instances, but as potentially convergent, because they start from a continuous process of permanent updating that enables the articulation between the real world and the virtual world. Thus, it is understood that the virtual is real, even if it cannot be fixed in the determined time and space.

Schön (1992) argues that "an orchestra rehearsal is also a virtual world, just like a role-play or a computer screen". In this sense, the author defines the virtual world as any scenario that represents a real world and that allows us to experiment, make mistakes, become aware of our mistakes and try again, that is, the world of practice. For Schön (1992, p. 11), "[...] all this takes place in a Praticum, which is a virtual world that represents the world of practice".

The integration of real and virtual information in the same environment is a very effective way to put the student in front of distant or inaccessible content or people, without taking away perceptions related to the real environment that surrounds him. "With this, it is possible to combine the advantages of VR with the maximum sense of presence provided by local activities. The potential of this union is very stimulating for educators and students" (Tori, 2010, p. 157-158).

It is understood that the use of 3D technology in virtual reality can contribute significantly to Science Teaching, since it makes it possible to carry out simulations of abstract contents. As happened in this study, in which students experienced the use of 3D Software in the study of Science, based on AI, 3D Software helped students develop problem-solving skills and worked as a complement to what was studied in the Textbook or illustration on the blackboard.

3 THE TEACHING OF NATURAL SCIENCES WITH DIGITAL TECHNOLOGIES

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. In a world of constant change, teachers need to understand that students have changed, and that the old educational paradigms are not meeting their demands.

It is defended, here, that the teaching of Natural Sciences should, therefore, start from a contextualized perspective, having the student as a producer and co-producer, in order to know how to interact with different types of information, concepts and practical experiences from their experiences, ethical values and social beliefs that are required by contemporary society, so that teaching can contribute to the formation of the lives of critical citizens, who know how to position themselves in the face of the challenges of science and technology.

Technologies are bridges that open the classroom to the world, that represent, mediate our knowledge of the world. There are different forms of representation of reality, in a more abstract or concrete way, more static or dynamic, more linear or parallel, but all of them, combined, integrated, enable a better apprehension of reality and the development of all the potentialities of the student, of the different types of intelligence, skills and attitudes (MORAN, 2007, p. 05).

The National Common Curriculum Base (BNCC) says that technology comes in as an ally of the teacher and the student, and directly advises that the use of digital information and communication technologies should be used to produce knowledge and solve problems in the Sciences – something not so present in the National Curriculum Parameters (PCN, 1997).

The BNCC advises that the teacher has a more critical training in relation to digital technologies so that their use is pedagogical and intentional and not just to enhance a class, and that students must be able to master the digital universe, making a meaningful, reflective and ethical use of the available resources, something present in general competencies (digital culture) and in the specific sciences.

The BNCC expresses the importance of adopting the investigative approach as a central element of training. The teacher must intentionally enable students to actively participate, a direct relationship with the issue of scientific literacy. And it is not enough just

to test the concepts, it is necessary to build them collectively.

The normative document clarifies that the teaching of the component must provide experiences in which children and young people can get involved in all stages of the scientific investigation process: observing, asking, analyzing demands, proposing hypotheses, developing models and explanations, developing, disseminating and implementing solutions to solve everyday problems, among others.

This is a point of attention to abandon once and for all the mere transmission of content in expository classes and memorization, still present in many schools. Therefore, the teacher's function is to be a source of information and, mainly, to guide the students' investigative actions to develop skills and competencies with autonomy.

Moita (2007) states that teachers, in their different disciplines, must integrate digital resources into their pedagogical work, in order to promote new forms of interaction and learning. Thus, it is understood that Science teachers need to rethink their methodologies, strategies and resources used in pedagogical practice to motivate students and offer them new learning experiences and the world to act, create, think and live actively in a society of constant change. Next, an Interactive Didactic Sequence (SDI) for Science Teaching, with the use of 3D Software, carried out during the studies of the Master's Degree in Teacher Training at the State University of Paraíba - UEPB

4 INTERACTIVE DIDACTIC SEQUENCE IN THE TRAINING OF SCIENCE TEACHERS WITH 3D TECHNOLOGIES

The idea of developing an Interactive Didactic Sequence as a use of 3D Technologies arose from the readings that grounded this study, as well as from the observations of Science classes with the application of the P3D educational software, when some difficulties faced by teachers regarding the use of this resource in pedagogical practice were observed.

It is argued that integrating 3D digital resources in science teaching can be a way to put students and teachers in front of new experiences and learning situations, a moment in which they will be able to experience virtual experiences with content and people from simulations in the real environment. In this context, it was clear the need to disseminate the thought of scholars who work with this theme through an Interactive Didactic Sequence, since this methodology enables interaction and sharing of knowledge and knowledge.

Oliveira (2013, p. 58) defines Interactive Didactic Sequence (SDI) as a new didactic-methodological proposal that has as "[...] procedure the construction and reconstruction of concepts on different themes of the curricular components of basic education, undergraduate and graduate courses". Also for this author, the Interactive Didactic Sequence (SDI) is

developed based on a series of activities for the systematization of concepts and definitions of a given theme, aiming at the construction of new knowledge and knowledge. In the Interactive Didactic Sequence described below, the steps defined by Oliveira (2013) were used, as mentioned in the fourth chapter of this study.

Therefore, by applying this SDI, it is intended to investigate aspects inherent to the theoretical conceptions of Science teachers about 3D Technologies and to share experiences, aiming at the construction and reconstruction of new knowledge regarding the proposed theme.

Thus, the objective is to present a didactic sequence focused on the teaching of Natural Sciences in Elementary School, developed as an educational product of the dissertation of the Graduate Program in Teacher Training (PPGFP) – Professional Master's Degree, at the State University of Paraíba (UEPB). An Interactive Didactic Sequence (SDI) was developed and applied with a qualitative approach, based on pedagogical intervention.

SDI, focusing on the use of 3D and Virtual Reality technologies, was applied and discussed with teachers and future teachers of Science and Biology during 5 meetings in the Computer Laboratory, in a private institution of Basic Education, in the city of Campina Grande, PB. The results indicate contributions to methodological changes in teachers' practices, in addition to favoring interaction and the construction of knowledge in the teaching of Science and Biology. The study evidenced the articulation between academic research and educational product with practical application, through the interaction, discussion and evaluation of the P3D software and theoretical studies on the integration of digital technologies in Science Teaching. Next, the Interactive Didactic Sequence (SDI) is presented.

4.1 CONTINUING EDUCATION WITH SCIENCE TEACHERS: APPLICATION OF THE DIDACTIC SEQUENCE

4.1.1 SDI's first sequence of activities – Survey

Stage 1: The procedures for the application of the Interactive Didactic Sequence (SDI) will be presented and discussed with teachers and future teachers of Science and Biology, as a methodology that can act as a facilitating agent for the interaction, construction and reconstruction of new knowledge in Science Teaching with the use of 3D Technologies. The place chosen for teacher training was the School's Computer Laboratory.

Stage 2: Moment of the surveys, through interaction with teachers, we carried out a dialogue about the importance of using technologies in Science Teaching and the impacts they may have on the teaching and learning process. Questions, such as: **What is 3D**

Technology? How to integrate 3D Technologies in Science and Biology classes? After all teachers answer the questions, they will be divided into small groups. Each group was asked to discuss the proposed questions. After the discussion, each group will be asked to prepare a synthesis of the issues.

Step 3: In this step, each group must choose a representative, and thus a new group will be formed, with only the representative of each group in which the conceptions of each group were synthesized in a single concept. The teacher in the classroom will mediate, asking the group representatives to make a synthesis of all the small groups. Thus, a general synthesis (definition) will be built on what teachers understand by the proposed questions.

Stage 4: The new synthesis will be presented and discussed with the large group and with the classroom teacher, so that a new definition can be elaborated, a process that, for Oliveira (2013, p. 59), is characterized as the beginning of the construction of new knowledge.

Stage 5: The new synthesis will be presented and discussed with the large group and with the classroom teacher, so that a new definition can be elaborated, a process that, for Oliveira (2013, p. 59), is characterized as the beginning of the construction of new knowledge.

4.1.2 Second sequence of SDI activities – Theoretical and practical basis

Step 6: To systematize, discuss and substantiate the possible answers to the questions, the teacher and/or trainer should seek the theoretical foundations of the authors (books, texts, slides, documents, images, videos and other resources) to work with the participants, always in constant dialogue with the teachers. At this stage, the teacher/trainer should base the content of the theme under study on authors such as: Lévy (2004), Moita (2006, 2016), Gee (2001), Prensky (2001, 2010, 2013), Papert (1996); Silva (2012) and other theorists who treat and consider Digital Educational Technologies in the school context as allies of cognitive development, teaching innovation and as contexts that structure the ways of thinking, doing, communicating, establishing relationships with the world and representing knowledge.

Stage 7 (Conclusion): It will be carried out, based on the articulation of theoretical and practical knowledge. In this way, teachers will explore the P3D Software – in Module 1 – Sciences (Human Body), already installed in the computers of the Computer Lab. They will be invited to dialogue among their peers, how they can use the P3D Software in future classes with their classes. Finally, this stage can be conducted by requesting a new written version of the contents studied. To close the contents, it is suggested as activities that the participants reflect on the following question: **What are the contributions of integrating digital technologies, especially 3D technologies, in Science and Biology classes?** At

this stage, it is important that the teacher is creative, interactive and dynamic, and has awareness and intentionality in planning so that the learning results can have positive impacts.

5 METHODOLOGY

The present study in Education is part of a qualitative investigation, since it took place in the natural environment of the school. Thus, a descriptive exploratory study was carried out in the school context, since, with this type of methodology, the researcher can observe, analyze and describe the experiences carried out in the classroom, prioritizing the process more than the product and being concerned with reporting the perspective of the subjects.

According to Severino (2007, p. 123), "exploratory research seeks to gather information about a certain object, delimiting a field of work and mapping the conditions of manifestations of this object", as was done in this investigation, in which it was sought to collect information and describe the process and effects of the use of P3D educational software in the practice of teaching and learning Science, aiming, above all, to understand the meaning that the subjects attributed to the experience of using this digital resource.

Data analysis was performed in a descriptive and inductive manner. The collected data were recorded in field notes (through observations in a computer lab and classroom) and semi-structured interviews were conducted with the teacher and students.

The researched field was a confessional private educational institution, of Basic Education, located in the municipality of Campina Grande - Paraíba

6 RESULTS AND DISCUSSIONS

It was sought, systematically and pedagogically, to observe the students and the teacher when making use of 3D digital resources, especially a software for the Teaching of Science (Human Body). Their opinions on the effects of this resource on the teaching and learning process were collected. The results revealed that Virtual Reality and 3D technologies enabled more participation, engagement and improvement of students' performance in Science classes, and above all the personalization of teaching.

With the data collected in the participant-observations, it was possible to verify that the classes became more playful and dynamic and that there was an improvement in the interaction, attention and concentration of the students, compared to the classes in which usual resources were used, such as the textbook. Another aspect observed concerns the interest and creativity of the students in performing the task proposed by the teacher. They used 3D images, animation and texts to simulate the functioning of the human body and the

digestive system normally in the classroom.

Also in the observations, it was found that the teacher was driven to modify the methodology and the way he approached the contents, using simulation and experimentation to explain the functioning and structure of the digestive system, which was done through the textbook and illustrations on the blackboard.

In addition to motivation and more dynamic classes, students were placed in front of a new learning culture, through which they made new connections about the importance of healthy eating for the proper functioning of the digestive system and the human body in general. By proposing a contextualized study concerned with health, using the educational software P3D, the teacher encouraged students to relate theoretical concepts to practice, such as the function of the organs of the digestive system and their functioning, which increased their learning.

The statements of the students and the teacher, subjects of this study, ratify the hypothesis that the educational software P3D is a resource that can contribute to the teaching of Science, if used appropriately. The students expressed that they were able to learn differently about the digestive system, especially about the function of organs and the importance of their functioning for the human body.

The students' speeches also reveal the importance of using digital resources such as the P3D educational software for learning, as students can learn with pleasure, having fun and through challenges, as they pointed out in their speeches. Such aspects denote that the young people of this generation yearn to participate in projects at school that contemplate interaction, playfulness, participation, creation and co-creation in the various subjects of the school curriculum.

In the professor's speech, the important contribution of the software to the practice is verified, as it enables new ways of teaching. Aspects such as integration with curricular content, interaction and better student performance were highlighted by him. It is also important to highlight an important impact on the teacher's practice, as well as the possibility of associating theoretical and practical knowledge in a contextualized way, contrary to the traditional legacy of science teaching, based on bookish and transmissive teaching.

When, in the classroom, one manages to motivate and awaken the desire to learn with pleasure and make new discoveries, this means opening new paths for knowledge of the world. As the students' statements revealed, the P3D software was useful in the process of learning Science because, in addition to the contents, they learned for life, making their own discoveries, and started to have more performance in the discipline, as well as more admiration for the school and their teacher.

In this sense, it is possible to verify the importance and responsibility of the school as a space for human interaction that integrates resources and proposals that provide innovative and student-centered teaching. Teachers need to launch themselves into the promotion of an innovative practice, based on new educational paradigms, so that they can produce new identities, knowledge and practices in the classroom, encouraging students to have autonomy, to discover, share, create and socialize a new way of thinking.

7 SOME CONSIDERATIONS

How are schools and teachers seeing their role in the school of the twenty-first century? How are digital resources reaching the school and how are they being used? How are teachers and the entire team that is part of the school being prepared to face the new challenges of the digital age? Is the school, as a promoter of knowledge, enabling students' access to digital resources, to guarantee their right to digital literacy?

Such questions refer to some difficulties and limitations encountered in the course of this study. Among them, the way most teachers and school staff understand the integration of digital technologies in the teaching and learning process. It is seen that a change of vision is still necessary, so that all those involved in their context carry out a joint and reflective work on the action and results of the use of technologies in the school, which is not limited to the figure of the mediator of the school's technologies.

The lack of training and the lack of interest of teachers to incorporate the P3D educational software in their pedagogical practices were difficulties encountered in the course of this study. Among the 20 teachers who went through continuing education for the use of P3D, only one – the Science teacher – presented a proposal for its use, putting it into practice. This fact limited the research to the discipline "Sciences". Another difficulty concerns the use of P3D software itself, since it requires computers with sophisticated processors and video cards, which we do not always find in schools.

Finally, it is suggested that future investigations be carried out not only in the discipline of Natural Sciences, but in the other disciplines of Basic Education, anchored in the use of 3D digital resources in the classroom so that the way of teaching and learning in the digital age can be rethought.

Rethink the practice of teaching and learning! This is the great challenge of the school of the twenty-first century, where the virtual and the real coexist in a world in constant mutation. It concludes, then, with the words of Moita (2006), when he states that recognizing the potential of digital technologies for the process of teaching and learning is to live in a contemporary world, with its changes, and to accept them to collaborate with the education

of the new generations.

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APPENDIX

P3D Software – Datasheet

Developer Data: <http://www.p3d.com.br/empresa/>;
Version: 07/20013
- Supported platforms: Tablets; Desktops and Laptops: Windows 7 and Vista
Windows XP (32 Or 64 Bits) and Mobile;
Area of Knowledge: Science, Geography, Biology and Chemistry of Elementary and High School;
Language: Portuguese, Spanish and English;
Didactic Guide: Portuguese, Spanish and English.