Use of virtual reality in teaching dentistry: A pilot project

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ABSTRACT
The use of active methodologies in the teaching-learning process has been widespread in many teaching institutions, and dentistry is no exception. In addition to providing students with a more global view, it offers more individual autonomy and collective awareness, since more active work, with problems, is beneficial for their development. In view of this, this paper reports on the experience of producing a 360º video of a routine situation in dentistry: patient preparation and handwashing in the operating room. The material prepared is intended to serve as a tool for the student to be able to assist him/her in advance of subsequent practices, as this way he/she will have the possibility of being more ready, which seems to lead to favorable performances of some dental activities. The tool presented here is a new resource that can be combined with traditional teaching methods and its impact must be assessed.


1 INTRODUCTION
In the middle of 1910, the Flexnerian model, which was adopted by training institutions, was widely disseminated at a time when teaching was unidirectional and centered on the teacher1. One of the main purposes of the current forms of instruction is to provide students with learning with an overall view, making them develop individual autonomy and collective consciousness2-4. Increasingly, there is a need for changes in the learning process. This corresponds to differences with regard to the training process, but such a process is challenging5. Proof of this diversity is to be found, for example, in “schools that are in the 19th century, with teachers from the 20th century, training students for the 21st century world”6. A survey with reference to factors that
favor and compromise the quality of dental education revealed precisely, among the latter, the existence of traditional, old, and deficient curricular programs, that is, the existence of a deficit in terms of innovation. There is also a notable conflict between those who defend traditional or innovative models.

Active methodologies are practices that incite interest where students are included in the reasoning processes and bring new components to the theory; these had not been previously considered. These methodologies use problematization as a learning vehicle in order to motivate, since the student, in the face of difficulties, starts to reflect on fundamental points for the promotion of their own development. In addition, the development of active models allows the student to acquire a broader conception of their knowledge and, in the case of health professionals, go beyond the dimension focused on the absence of disease. In this way, students are offered theoretical knowledge based on the observation of reality, which allows the theory to be learned with a practical connection.

According to Cunha et al., “... An innovative experience is a process located in a historical and social context that requires a break with academic procedures inspired by the positivist principles of modern science. Innovative movement in the micro-institution can be as important as the movement of the institutional whole.”

In dentistry, there is a great possibility for the use of active methodologies, such as problematization, blended learning, projects and more currently simulators, with the potential to develop autonomy through learning. However, it is important to emphasize the paramount importance of maintaining the quality of teaching, a fact that can be compromised due to a large number of students in the classroom.

In the dental field, digital transformation is recognized as one of the main changes of the 21st century that can be used to face challenges in oral health. In this context, virtual reality (VR) appears as a new possibility of connection, as three-dimensional reproductions closer to the user’s reality allow students to break the screen barrier, providing for more natural contacts. In addition, the fact that virtual objects are brought to the user’s physical space allows for more spontaneous and uncomplicated concrete interactions without the use of special equipment. For this reason, VR has been considered a tangible possibility that could be popularly used with the next generation, whether indoors or outdoors. VR, specifically in the teaching area, has been used in pre-clinical dental training, in implant dentistry, and in maxillofacial surgery.

The present experience report describes the development of a VR film in 360° as a way of using this instrument to help dentistry students.

2 EXPERIENCE REPORT

The present study is an experience report of a 360° video with a dental theme that can feasibly watched with VR glasses.

First, the script for the film was planned by a dental surgeon, an assistant in oral health and an actor in order to represent a fictitious situation of preparation for the dental care of a patient in the surgical center of Universidade Positivo, located in Curitiba, Paraná.

A 360° camera (Samsung Gear®, Manaus, AM) was used, monitored by a specific application (VSDC Free Video Software, http://www.videosoftdev.com/). The camera was positioned with the aid of a tripod over the
dentist’s head to simulate her vision and record the entire sequence, from entering the operating room and surgical handwashing (figure 1) to patient preparation for surgery (figure 2). The video was recorded and made available to students (https://www.youtube.com/watch?v=HWkQ-6u3j-I).

Figure 1. Image captured from the VR video showing the professional’s entry into the operating room and surgical hand washing

Figure 2. Image captured from the VR video showing the assembly of the operating table and the preparation of the patient for care

3 FINAL CONSIDERATIONS

The breaking of the “traditional” teaching model, marked by unidirectionality in the teacher–student relationship and by the fragmentation of people’s bodies and health, is becoming a reality in training institutions. This model is responsible for the training of professionals who have mastered the most diverse types of technologies, but who are little experienced in the subjective, cultural, and social dimensions of individuals, and is increasingly distant from the current model of organization of public health services in Brazil, as well as in view of the new behaviors expressed by the current generation11,29,30.

In contrast, one of the main purposes of current forms of instruction is to provide students with broad and autonomous learning2–4. It is precisely these assumptions that informed the list of competencies and skills set out in the National Curricular Guidelines for dentistry courses31.

The unprecedented technological development in the current world has led to a real revolution and renewal of digital media, and dentistry is no exception23. This implies that there are new forms of interaction and acquisition of knowledge, which can be a bridge between the student and his/her academic life. Considering the difficulties sometimes presented in expanding their knowledge about dental care, the use of VR can lead to a better understanding of this routine. The present study, then, sought to present a methodological proposal, based on VR
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In dentistry, VR use has been demonstrated in some areas\textsuperscript{18,23,25-28}. However, 360º videos are still scarce. The inclusion of students in VR is relevant, as the use of this tool in the university environment has the potential to influence not only the future of interactive entertainment but also interactive training, education, and simulation\textsuperscript{32}.

VR is an “advanced user interface” for accessing applications running on the computer, providing real-time visualization, movement, and user interaction. The sense of sight is often prevalent in VR applications, but the other senses, such as touch and hearing, can also be used to enrich the user experience\textsuperscript{33}.

However, it is appropriate to consider the limitations of this method. A recent literature review revealed that computer simulation has positive results in operative dentistry, for example, but VR needs to be viewed with more caution\textsuperscript{20}. Farronato \textit{et al.}\textsuperscript{34} also state that the validation of this entire educational process is still necessary. Joda \textit{et al.}\textsuperscript{23} note that technologies should be used in conjunction with human skills and qualities.

The use of interactive materials that combine books and applications, has been growing due to the combination of technology (whether in applications, games, or videos) that stimulates the search for concepts and the application of what is learned in practice. Among the limitations of this practice, it is important to emphasize that digital resources must be used in a correct and controlled manner, with the proper guidance and direction, in order for them to become an important tool and not a simple distractor\textsuperscript{32}.

It has been suggested that a study be conducted to evaluate the use of these films in different scenarios as a way of learning and integrating the student with the reality of the course and with the approximation of the practical experience of the dentistry course.

This study showed that VR video in 360º is a new resource that can be used in combination with traditional methods. Its ability to improve learning, decision-making, and resolvability remains to be assessed.

RESUMO
Uso de realidade virtual no ensino da Odontologia: um projeto piloto
O uso de metodologias ativas no processo de ensino-aprendizagem vem sendo amplamente difundido em muitas instituições de ensino e a Odontologia não foge desse contexto. Além de trazer aos estudantes uma visão mais global, oferece mais autonomia individual e consciência coletiva, uma vez que o trabalho mais ativo, com problematizações, é benéfico para o desenvolvimento dos mesmos. Frente a isso, aqui é relatada a experiência da produção de um vídeo em 360º, de uma situação rotineira em Odontologia: o preparo do paciente e a lavagem das mãos em centro cirúrgico. O material elaborado se propõe a servir como ferramenta para que o estudante possa assisti-lo previamente às práticas subsequentes, pois assim terá a possibilidade de estar mais adaptado, o que parece favorecer a execução de algumas atividades odontológicas. A ferramenta aqui apresentada é um recurso novo que pode ser combinado com métodos tradicionais de ensino e seu impacto deve ser avaliado.


REFERENCES

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