

## Learning based on virtual cases as support for a curricular module in the medical course

### Aprendizagem baseada em casos virtuais como suporte a módulo curricular no curso médico

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**ABSTRACT | CONTEXT:** This is an experience report on learning based on virtual cases as support for the curricular module of the Medicine course at a private educational institution in Salvador-Bahia-Brazil. By recognizing that students must carry out simulations/experiments, the possibility emerges of putting clinical case studies into practice with virtual support, as a strategy to promote the training of future doctors. **INTERVENTION:** In this report, the teaching-learning strategy from the year 2007 is addressed in a curricular component of the 6th semester, whose main educational objective is the development of clinical reasoning. **RESULTS:** This report is built on the experience of the teacher-observer-participant, who worked from planning and initial implementation to the current reformulation, with the introduction of technological innovations. The "Integrated Clinic II" curricular component, applied in the 6th semester of the medical degree, gained, in 2007, the virtual case resource to support the development of clinical reasoning and guarantee the prior study of clinical cases before the face-to-face moment. In 2021, to incorporate and maintain, beyond the pandemic, technological innovations carried out over time, the Patient 360 virtual simulator resource was introduced. **CONCLUSION:** The scenario of technological innovation does not conflict with the principles and objectives of education and practices in health services, being important adjuvants for teachers today, what is demonstrated in this report.

**KEYWORDS:** Medical education. Virtual simulation. Teaching technologies. 360 Patient Platform.

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**RESUMO | CONTEXTO:** Trata-se de um relato de experiência sobre a aprendizagem baseada em casos virtuais como suporte a módulo curricular do curso de Medicina de uma instituição de ensino privado da cidade do Salvador-Bahia-Brasil. Ao reconhecer que é imperativo que o estudante realize simulações/experimentações, emerge a possibilidade de se colocar em prática estudos de casos clínicos com suporte virtual, como estratégia para promover a formação do futuro médico. **INTERVENÇÃO:** Nesse relato, é abordada a estratégia de ensino-aprendizagem a partir do ano de 2007 em um componente curricular do 6º semestre, que tem como principal objetivo educacional o desenvolvimento do raciocínio clínico. **RESULTADOS:** Este relato é construído a partir da experiência do docente-observador-participante, que atuou desde o planejamento e a implantação inicial até a reformulação atual, com a introdução de inovações tecnológicas. O componente curricular "Clínica Integrada II", aplicado no 6º semestre da graduação médica, ganhou, em 2007, o recurso de caso virtual para dar suporte ao desenvolvimento do raciocínio clínico e garantir o estudo prévio dos casos clínicos antes do momento presencial. Em 2021, com o intuito de incorporar e manter, para além da pandemia, as inovações tecnológicas realizadas ao longo do tempo, introduziu-se o recurso do simulador virtual Paciente 360. **CONCLUSÃO:** O cenário da inovação tecnológica não conflita com os princípios e objetivos da educação e práticas nos serviços de saúde, sendo adjuvantes importantes para o docente na atualidade, o que é demonstrado nesse relato.

**PALAVRAS-CHAVE:** Educação médica. Simulação virtual. Tecnologias de ensino. Plataforma Paciente 360.

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## 1. Context of the situation

This is an experience report on virtual case-based learning as support for a curricular module with a timeline of technological innovations in the teaching-learning process of the Medicine course at a private educational institution in Salvador, Bahia, Brazil.

Medical education has undergone significant changes globally, adopting new approaches in the teaching-learning process. The traditional model of medical education, based on passive methods, has shown limitations in retaining knowledge and applying it in practice.<sup>1-3</sup> The teaching of clinical medicine presupposes the need for students to develop clinical reasoning based on data acquired in the admission history of the consultation (anamnesis and physical examination), such as clinical information, epidemiological data, main clinical conditions, and their determinants, in a unique way for each patient.

Recognizing that students must perform simulations/experiments, especially in the early stages of the course, and the obligation to preserve the patient, the possibility of implementing virtual case studies as a strategy to ensure the training of future physicians emerges. Virtual case-supported learning can be considered an active learning methodology, allowing the development of skills involving clinical reasoning and the identification of changes in complementary exams while offering meaningful content.<sup>4</sup>

In this report, the teaching-learning strategy is addressed over the period from its implementation in 2007 to the present day, in a curricular component of the 6th semester, which has as its main educational objective the development of clinical reasoning. This allows reflection on aspects that have been improved, those that have been successful, and, more recently, on the possibility of technological innovations, such as the virtual simulator, which is the object of study in the ongoing research project. The use of multimedia technologies can be an interesting strategy to complement the practical training of health science students. Virtual reality simulation allows them to experience complex clinical scenarios and train technical and behavioral skills without posing risks to real patients.<sup>5</sup>

This report is built from the experience of the teacher-observer-participant, who has been involved from the initial planning and implementation to the current reformulation, including the introduction of technological innovations. The stages of construction and implementation and the innovations outlined in the current research project have generated scientific products that have been presented at national and international medical education congresses.<sup>5-7</sup>

## 2. Intervention

In the curricular reform applied to the Medicine course at the Escola Bahiana de Medicina e Saúde Pública (EBMSP), an integrated modular component was created in 2007, with the main objective of allowing the development of clinical reasoning and the elaboration of diagnostic plans. The curricular component "Integrated Clinic II", applied in the 6th semester of medical school, consists of practical activities in outpatient clinics and clinical case discussions and integrates the modules of Semiology II (focusing on clinical reasoning and complementary exams) and Pharmacology (with basic therapeutic notions). The virtual case resource was applied to support the development of clinical reasoning and ensure the prior study of clinical cases before the face-to-face moment.

For the application of the focused strategy, the following steps were taken: 1) Choice of the Moodle platform for distance learning. 2) Registration and training of teachers and students in the virtual environment. This step is crucial because many teachers are still accustomed to the traditional teaching model and may have difficulty adopting active teaching methodologies, especially those involving the use of technology. 3) Joint planning of activities and definition of themes. Clinical cases for each week were made available five days in advance. On the first day, students were asked to formulate a diagnosis and list the problems, at most by the third day, when the possibility of responses was closed. On the third day, laboratory and imaging tests were released for comments, which were also sent to the teacher. The case was discussed in person on the fifth day in the medical clinic class and on the sixth

day in the pharmacology class. In parallel, students were encouraged to participate in a virtual discussion forum on the weekly theme, contribute a question for discussion, and answer another question posed by a colleague. 4) Monitoring by teachers to correct flaws, technical or pedagogical, and ensure the completion of activities. 5) Critical evaluation of the use of the tool at the end of the semester, obtained in meetings of teachers, representation of students from the modules, and application of an individual evaluation questionnaire by the students.

To update the component in 2018, various meetings and teacher training sessions were held, with a comprehensive review of activities and clinical cases, to meet the initially proposed objectives. At this moment, the focus on medical thinking and clinical reasoning, initial diagnostic and therapeutic plans were emphasized, with less emphasis on complementary exams and decision-making.

In 2020, due to the COVID-19 pandemic, case discussion was maintained in a tele-presential format. In 2021, to incorporate and maintain, beyond the pandemic, the virtual Patient 360 simulator was introduced, and a new strategy was implemented, consisting of the following steps:

1. Research and knowledge: research and choice of the tool to be used, obtaining information about the benefits, best practices, and examples of the success of these approaches, which helped understand how to adapt the strategies to the educational reality.
2. Identification of student needs: analysis of the needs and challenges of students. Understanding these characteristics helped in selecting the most suitable strategies to meet the specific needs of students.
3. Development of an implementation plan: creation of a detailed plan, with the identification of necessary resources, such as technology, teaching materials, and teacher training. Clear goals and realistic deadlines were set for the gradual implementation of strategies, taking into account limitations and available resources.

4. Involvement of educators: providing appropriate information and training for understanding and implementing the strategies.

5. Pilot development: before implementing the strategy on a large scale, it was important to conduct a pilot in a controlled environment. This allowed the evaluation of the effectiveness of the strategies, making necessary adjustments, and obtaining feedback from educators and students involved. The results and lessons learned during the pilot were used to improve the implementation.

6. Evaluation and adaptation: implementing new educational strategies is a continuous process. Regular monitoring and evaluation of the results, as well as feedback from students and educators, are important for making necessary adjustments.

7. Promotion of spaces for sharing best practices: sharing best practices helped disseminate educational strategies more widely and promote collaboration among educators.

### 3. Synopsis of results

In the initial semesters of the use of virtual resources for case discussion in 2007, some technical issues arose, requiring attention from the IT team and course tutors. After adjustments and the continuity of the project, there was intense student participation, demonstrating an in-depth understanding of the proposed weekly themes. The stimulation generated knowledge production above that observed in previous semesters, and the cases were made available in printed form.

The structure of the component was maintained until the decision to incorporate the virtual Patient 360 simulator, preserving the initial objectives of the component. Continuous supervision, actions for teacher development, and continuous listening to teachers and students, with a scientific research model to prove results, have been fundamental for the continuity of the innovation project with the inclusion of new educational strategies effectively and sustainably.

## 4. Conclusion

The strategies used for the incorporation of new educational technologies, combined with research projects, have proven to be effective. The scenario of technological innovation does not conflict with the principles and objectives of education and practices in health services, being important adjuncts for teachers today. The incorporation of new technologies, when carried out with well-defined criteria and strategies, considering the needs, and perception of students and teachers, and teacher development actions, is possible and effective, contributing to the constant improvement of curricular components.

### Authors' contributions

Caldas N, Aleluia IMB, Menezes M, Silva MG, Santos GR, and Aguiar CVN participated in the conception of the research question, methodological design, search and statistical analysis of the research data, interpretation of the results, and writing of the scientific article. All the authors have reviewed and approved the final version and agreed with its publication.

### Conflicts of interest

Nenhum conflito financeiro, legal ou político envolvendo terceiros (governo, empresas e fundações privadas, etc.) foi declarado para nenhum aspecto do trabalho submetido (incluindo, mas não se limitando a subvenções e financiamentos, participação em conselho consultivo, desenho de estudo, preparação de manuscrito, análise estatística, etc.).

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