

# Experiential Learning Theory in Serious Gaming to Foster Clinical Reasoning in Orthopedics: Adaptations in Response to COVID-19 era

Ayat Eltayar<sup>1\*</sup>, Soha Rashed<sup>1,2</sup>, Abdullah Hammad<sup>3</sup>, Ibrahim Eldaly<sup>4</sup>, Iman Diab<sup>1,5</sup>, Hoda Khalifa<sup>1,6</sup>, Noha Eldesoky<sup>1</sup>

<https://orcid.org/0000-0001-7177-1126>

1 Department of medical education, faculty of Medicine, University of Alexandria, Alexandria, Egypt.

2 Department of Public health, faculty of Medicine, University of Alexandria, Alexandria, Egypt.

3 Department of orthopedics and traumatology, faculty of Medicine, University of Alexandria, Alexandria, Egypt.

4 Department of orthopedics and traumatology, ministry of health, Egypt.

5 Department of Biochemistry, faculty of Medicine, University of Alexandria, Alexandria, Egypt.

6 Department of Histology, faculty of Medicine, University of Alexandria, Alexandria, Egypt.

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\***Corresponding Author:** Department of medical education, faculty of Medical medicine, University of Alexandria, Alexandria, Egypt. Mobile phone: (+002) 01200009661.

[a\\_youssef15@alexmed.edu.eg](mailto:a_youssef15@alexmed.edu.eg)

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## ABSTRACT

*Clinical reasoning is an important aspect in learning medicine. Due to social distancing in COVID-19 pandemic, clinical training of residents in orthopedic department in Alexandria faculty of medicine (AFM) faced many restrictions. The experiential learning cycle of Kolb was adopted in serious gaming platform. "Mediactiv platform" was used to create a case to teach clinical reasoning for orthopedic residents. Our experience guarantees that Virtual patients and serious gaming platforms can be used to teach clinical reasoning, replacing face to face discussions. AFM is the first medical school in Egypt to use a virtual patient platform to teach clinical reasoning for graduates in orthopedics. Our experience was beneficial as mentioned by staff and trainers.*

## Introduction

Clinical reasoning is considered one of the core components of clinical competence in Orthopedics [1]. Clinical reasoning processes could improve understanding of the patient condition, early diagnosis and well-tolerated examination, as well as choosing the most appropriate intervention. Moreover, clinical reasoning skills help diminishing the risk of diagnostic error [2].

E-learning has been shown to be a valuable virtual tool to surgical training. Computer games are highly accepted and used by different generations, the concept of 'serious gaming' is subject to training research. Serious games

have already been evaluated in various situations within the framework of surgery, our aim is to evaluate acceptability and educational impact of incorporating a multimedia training approach to sports trauma medicine [3].

While online instructional platforms to teach clinical reasoning have been developed, Egyptian medical schools had very limited or no experience in using such platforms.

### What was the problem?

Due to social distancing in COVID 19 pandemic, clinical training of residents in orthopedic department in Alexandria faculty of medicine (AFM) faced many restrictions. Regular scientific meetings were postponed. There was a need to move to a more safe but authentic alternative.

### What was tried to solve the problem?

“Develop clinical reasoning skills to manage sport-injuries cases.” is an objective of the training residency program. The experiential learning cycle of Kolb was adopted in serious gaming platform. Experiential learning cycle is one of the learning theories that can guide the use of serious gaming as an instructional tool [4]. Various platforms are available for creating virtual patient scenarios or serious gaming tools. “Mediactiv platform” was used to create an authentic serious game on anterior cruciate ligament (ACL) tear in football player. **Concrete experience** is the first step in Kolb’s learning cycle in which residents developed their concepts about ligamentous injuries in the knee through their training in the orthopedic department through attending scientific meetings, conferences, attending outpatient clinics and rotations in wards. **Reflective observation** in this step of the cycle, the learners would play the game in which a clinical problem was created using virtual patient who recounts his trauma history after a football match. The student would be directed to ask the virtual patient to complete the history. Then clinical examination would be there as the candidate would inform the virtual patient about the position for the clinical examination starting by inspection, then palpation, and special tests. Videos were uploaded to show the results of the clinical examination tests then the learner has to observe the videos and decide a differential diagnosis of the case. Then, the candidate would order investigations for the patient, where the platform was fed by MRI images for a case of ACL tear. Then the student would deliver a final diagnosis. The virtual patient would ask the learner certain questions about the need and timing for surgery, as well as the lifestyle and ability to practice football again. The learner would deliver a health education message with rational. Feedback would be delivered to the learner. The learner would use the

clinical reasoning skills to solve the problem dealing with the virtual patient. **Abstract concepts** would be developed after the gaming experience. New concepts and modification of previous concepts would emerge in this stage. **Testing concepts in new situation** would be achieved through synchronous discussion after taking the game would be arranged with a new case of ACL injury and the learners would be asked to develop a management plan for it.

### What lessons were learned?

1. Virtual patients and serious gaming platforms can be used to teach clinical reasoning replacing face to face case discussions. AFM is the first medical school in Egypt to use a virtual patient platform to teach clinical reasoning. Our experience was beneficial and equal to face to face case discussion as mentioned by staff and trainers.
2. Draw a theoretical framework to guide your design while using serious gaming.
3. An authentic script that is achieving specific learning objectives is a mandatory step in designing a serious game.
4. Using new technology would enrich the learning experience in medicine if properly designed.
5. Providing constructive detailed feedback “virtual tutor” is crucial to deliver the educational message and build the new concepts using online experiential learning cycle.

### Disclaimer

The article has not been previously presented or published.

### Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

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