



EYE LEARN : Innovative pedagogical process using eye tracking in acute care simulation

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HumanTech

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INTRODUCTION

- A **clinical reasoning using a systematic approach** to assess and treat the patient's airway, breathing, circulation, disability and exposure (ABCDE) has been developed at the School of Health Sciences (Verdon & Menoud, 2022).
- In nursing education, simulation is an essential tool to develop clinical reasoning, judgment and decision-making. In this context, **situation awareness** is essential (Endsley, 1995).
- Pedagogical sciences show the importance of developing **metacognitive skills** to help learners to progress effectively (Leclercq & Poumay, 2004).
- Work on eye tracking shows that **ocular fixations** can be correlated with an integration of observed data (Negi & Mitra, 2020).
- We have developed **EYE LEARN** to help students analyze their simulations, carried out with eye-tracking glasses, on an educational platform that supports analysis and reflection.

AIMS

- To improve the application of this **systematic clinical reasoning (ABCDE)** throughout the students' curriculum.
- To enhance students' **metacognition**.

RESULTS

- 1. Students reported outcomes** (5-point Likert scales)
 - + **User experience/interface:** Glasses: easy to use (4.72) and non-invasive (4.1). Interface (4.1) and instructions/video tutorial (4.86) clear and easy to use.
 - + **Learning:** progress on the elements of clinical care (4.17) and metacognitive reasoning (4.03), added value in training (4.07), positive change for the next intervention (4.34).
 - The annotation of the ABCDE approach phases (4). The accuracy of the eye-tracking metrics (3.66).
- 2. Students reported outcomes** (Short French version of the User Experience Questionnaire)
 - + **Pragmatic quality:** 1.72/3, **Hedonic quality:** 2.32/3, **Overall:** 2.02/3. User experience of the process considered as **excellent** regarding the benchmark set by the authors' questionnaire (Schrepp et al., 2017).
- 3. Teachers Focus Group outcomes**
 - + Easy to use glasses, easy to annotate the ABCDE phases, little impact on the progress of a "standard" simulation, added value for students.
 - Adding a task during observation impacts the teacher's mental workload.

METHOD

● Teacher ● Student ● Both
 ● 29 nursing students Pupil Invisible Glasses

Before the simulation :
● **Several weeks before :** Briefing about the new process with eye-tracking glasses.
● **On the day of simulation :** Equipping the student with the **eye tracking glasses + calibration**.

During the simulation :
● **Students :** perform care and clinical reasoning through the **ABCDE's systematic approach**.
● **Teachers :** In the video control room, **annotating ABCDE phases** on interface.
Data collected = Voice and video from the student's point of view + **ocular fixations**.

After the simulation :
● **Debriefing session** with the student.
● **The student analyses his/her simulation** on a second custom interface, with guided metacognition questioning following the timeline below.

1 2 3 4 5 6

Nurse Clinical Reasoning Scale Annotation Global analysis Subphase analysis Comparison with teacher annotations & metacognition Nurse Clinical Reasoning Scale

3 relevant metrics of situation awareness describing the students' gaze distribution over different areas of interest (AOIs) and periods of the simulation :

- Fixation rate
- Fixation time in AOIs
- Percentage of time spent in AOIs

AOIs were detected with a YOLOv5 model (artificial intelligence algorithm)

CONCLUSIONS

- This educational innovation project provides **very encouraging initial results**.
- Consequently, **this procedure was implemented** as part of the Bachelor of Nursing training at the School of Health Science in Fribourg.
- **Further studies will be led** to prove the added value of the EYE LEARN process on students' clinical reasoning and metacognition.
- Other specialties or areas of learning have already shown interest in **potential transpositions** into their training activity in Switzerland or abroad.
- **Multidisciplinary collaboration** between the School of Health Science and HumanTech in Fribourg is a **big value**. Progression comes from complementarity.

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