First Aid applied to emergency situations

1. What are the goals of the learning environment in relation to the specific task chosen? What is the context in which the teaching is intended to take place?

The scenario is that of an accident in which the main character provides first aid care to the victims around the area. The protagonist is therefore a first aider who would apply the necessary care to the patients while waiting for the arrival of the ambulance or a paramedic. The victims will be affected by five possible injuries (broken bones, seizures, breathing problems, bleeding and burns), that the student need to diagnose and took care of.
This will be a VR software so to be more immersive for the users. In each level, there will be a specific number of people to be treated and for each one of them, a 2-minute countdown to diagnose and treat the problem. The faster the treatment, the more points obtained.

2. Who are the intended learners? How does the environment adapt, or customise its teaching, to the learners? Are both cognitive and affective aspects adapted to?

This will be a basic trainer for people who doesn't know anything about first-aid. The target group are senior high school students, assumed to have no prior knowledge about first aid.
The users are witnesses of a road accident, where they are supposed to call for professional help and in the meantime use their first aid skills to help the victims. The student walks around the affected area, searching for injured people and starts interactions with them to apply the proper procedures.
The program provides the students with various First Aid situations and makes them answer MCQs, randomly selected from a category divided database. The system also keeps track of the incorrect answers so to assign more questions from the least successful categories. Moreover, the task starts with the possibility of asking for hints, which become increasingly more vague as the student progresses through the levels.
This MCQ approach is suitable because the students have to search for a proper reaction to the specific situation, but the presence of the different choices help them recalling the different solutions available. The increasing vagueness of the hints is beneficial to prevent excessive use of them as a strategy to progress through the various tasks.Varying types of question in multiple choice can help users improve their critical thinking skills.

4. What approach does it take to teaching? Why is this approach suitable for this task?

For this program we drew inspiration from Crystal Island and APT tutor.
From Crystal Island we took the narrative history idea. In our version the protagonist finds himself in a car accident and needs to help the people around him. This situation engages the user emotionally and tries to simulate the stress of having to deal with a high risk situation. (McQuiggan, Rowe, Lee, & Lester, 2008)
APT tutor, instead, was used to compare different types of feedback: i) immediate feedback, ii) immediate flagging and iii) retrospective feedback. Using these ideas we provided different types of feedback throughout the game. Immediate flagging triggers after each users' answer, on-demand feedback is provided as hints in the initial levels and retrospective feedback is shown at the end of the game to recapitulate the general performance of the student.

The game has various metacognitive aspects. Various strategies are available to deal with the environment, such as choosing between the people to attend and starting from the most urgent victims or going for a first-come-first-served tactic. Moreover, each scenario present an increasing difficulty, like increased vagueness in the hints (or none at all), increasing complexity of the patient's condition and the need for robust (or adaptive) reaction techniques.

The role of the narrative structure is to emotionally engage the user in the game, relating it to a lifelike situation and preparing the user for a stressful real life tragedy. It also enables the system to monitor the user's goals and determine whether they are consistent with the plot (Rowe et.al, 2009).
The feedback improves the metacognitive abilities of the student, reassuring them of the knowledge they already possess while highlighting where they still lacking preparation.

5. How does the system interact with the user? Describe an example interaction: you may use possible screenshots, hypothetical dialogues, etc.

The system interacts with the users in three ways: i) marking the answers as right or wrong, ii) providing hints in the initial levels of the ITS, iii) rewarding the users with bonus points for good performance. At the start of each scenario, a countdown starts on a visible timer so the users know how much time they have to complete the level. The time given is also difficulty dependant on the level. At the end, there is a statistical report of the right and wrong questions answered.

Example:

The user views through a VR headset a scene of a road accident with injured people. On the top of the screen, there is a countdown that will start running. With a controller, the user selects which person he will help first. Then, a close-up of the person's injury appears, and the system asks the user to identify which type of injury it is, via a multiple-choice question. The user now must decide a way to treat this injury, by selecting from all possible answers. The system will show visual feedback of whether the questions have been correctly answered, and it will give points to the user accordingly. Then, the road scene will reappear so that the user can select the next injured person to treat.

References

Corbett, A. & Anderson, J. (2001). Locus of feedback control in computer-based tutoring: Impact on learning rate, achievement and attitudes. *Proc. of ACM CHI'2001 Conference on Human Factors in Computing Systems*, pp.245-252. 10.1145/365024.365111.

Li, L., Yu, F., Shi, D., Shi, J., Tian, Z., Yang, J., … Jiang, Q. (2017). Application of virtual reality technology in clinical medicine. Am. J. of Translational Research, 9(9), pp.3867–3880.

McQuiggan, S.W., Rowe, J.P., Lee, S. & Lester, J.C. (2008) Story-Based LEarning/ The Impact of Narrative on Learning Experiences and Outcomes. In B. Woolf et al. (Eds.) (2008) ITS 2008, LNCS 5091, pp.530–539.

Rowe, J., Mott, B., McQuiggan, S., Robison, J., Lee, S., & Lester, J. (2009). Crystal island: A narrative-centered learning environment for eighth grade microbiology. In *Workshop on intelligent educational games at the 14th international conference on artificial intelligence in education*, Brighton, UK, pp.11-20.

Zaidi, N. L. B., Grob, K. L., Monrad, S. M., Kurtz, J. B., Tai, A., Ahmed, A. Z., ... & Santen, S. A. (2017). Pushing Critical Thinking Skills With Multiple-Choice Questions: Does Bloom's Taxonomy Work?. *Academic medicine: journal of the Association of American Medical Colleges*.