D2P/CLS: A Tutor for Combat Lifesavers

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1. Introduction

Tactical Combat Casualty Care (TCCC) has been shown to save lives on the battlefield (NAEMT, 2010). These guidelines suggest that Combat Lifesavers (CLS), specially trained Marines operating at the platoon level, are pivotal for reducing causalities because they reduce the time between injury and care. These skills include both the assessment and the treatment of injuries, such as hemostasis, airway management, etc. Importantly, these skills require the proceduralization of interdependent time-sensitive skillsets.

To provide Combat Lifesavers with the opportunity to learn and maintain the skills necessary to implement TCCC techniques, we are starting to create a tutor called D2P/CLS. The D2P (Declarative to Procedural) architecture has been used previously in a marksmanship tutor (Hiam, Ritter, & Morgan, 2012; Ritter, Morgan, Hiam, & Kim, 2011). D2P uses iterative learning loops to introduce the material, followed by dynamic exercises that increase in complexity as the learner progresses through the tutor. We believe this approach will not only provide a training aid but also act as a form of sustainment training. The simulations within D2P/CLS will provide background information on the situation, present an injury to the learner, and present the learner with a visualization of the injury. After the learner has attempted to treat the injury, the D2P Interpreter will provide feedback to the learner to allow the learner to recognize mistakes.

2. Declarative To Procedural (D2P)

The design of the D2P tutoring architecture is focused on supporting the learner in learning declarative information and proceduralizing that information (Hiam, Ritter, & Morgan, 2012). This approach is based on a recent review of learning theory (Kim, Ritter, Koubek, in press). Figure 2.1 illustrates the implementation of this theory in D2P
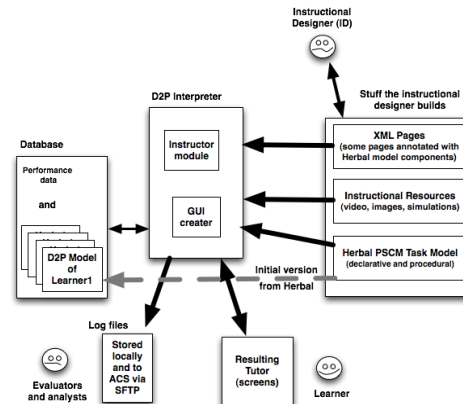

Figure 2.1. D2P implementation diagram

The D2P Architecture is designed around five major components: instructional design, the database, D2P interpreter, evaluation and analysis tools, and the user interface. The instructional designer provides content for the tutor by developing XML pages using provided templates and media. D2P allows us to easily incorporate insights from Subject Matter Experts (SMEs) into the tutor through the XML Pages. In addition, it supports the export of PDFs of the tutor to support iterative development by allowing SMEs to easily review the tutor's content.

D2P provides a tailored user experience by supporting output-based navigation; navigation occurs based on the success or failure of the learner throughout the course of the tutor. The database stores performance data and current models of the learners that are used to determine what content the learner needs to review. The D2P interpreter uses the content from the instructional designer and database to provide feedback to the users and evaluators. The resulting user interface appears from the D2P Interpreter by using the other tutor components, while the Herbal model will support a help function.

3. D2P/CLS: D2P applied to CLS tasks

To introduce the learner to CLS tasks, the tutor will provide the learner with a variety of combat-related

situations. These situations will first introduce singular injuries to the learner and require the learner to assess the casualty and perform basic interventions. These introductory skills will be required throughout the remaining portions of the tutor and will allow the learner to identify where they are weak early on.

As the learner progresses through the tutor, the situations will become more difficult, and the system will introduce sessions where the patient has multiple and more complex injuries. The movement from basic to more complex situations provides the learner with the opportunity to not only gradually build their knowledge but also to learn basic task management.

The tutor will use content pages, media, and simulations to introduce basic assessment, injury types, and interventions, as well as care management. Using a mixture of content, practice, and results pages, we aim to develop a set of declarative and procedural skills that the learner can apply across multiple settings. The simulations will also move from conceptual to more realistic representations as the learner demonstrates mastery of TCCC concepts. Figure 3.1 shows an early conceptual representation.
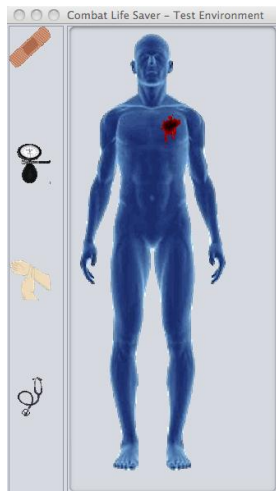

Figure 3.1. Initial draft D2P/CLS interface. Selectable tools are shown on the left.

4. Conclusions

D2P/CLS will provide an introduction on learning to become a Combat Lifesaver by teaching the identification and treatment of battlefield injuries. The D2P architecture facilitates the proceduralization of knowledge and allows for a customized user experience in the tutor. Learners will be taught using a combination of images, videos, text, tests, and simulations.

The complexity of the challenges the tutor will present the learner will increase as the learner progresses through the tutor. A potential end state scenario includes both declarative tests, as well as a realistic situation where the learner must correctly identify and treat multiple injuries. In summary, we hope the tutor will help save lives on the battlefield by teaching the required medical knowledge to learners in such a way that the information becomes proceduralized. We are currently developing D2P/CLS at Penn State, and will be testing it in conjunction with the Marine Warfighting Lab (MCWL) at Quantico, VA..

5. References

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6. Acknowledgements

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