VPH tools in clinical education: development of an Education Engine

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Introduction

A primary goal of VPH research is to generate validated tools that deliver improved clinical practice and patient care. The challenge of communicating VPH successes to the clinical community to promote adoption has been identified as a priority for the VPH Network of Excellence (VPH-NoE). An initiative to promote the value of VPH output has been implemented through collaboration between the VPH-NoE and the Association for Medical Education in Europe (AMEE, http://www.amee.org) to develop an "Education Engine". This effort seeks to adopt and adapt existing standards, methods and tools available within the Medical Education community to expose VPH project output in the form of educationally valuable, professionally presented material for clinical education.

The rich nature of VPH simulation output presents novel challenges in this domain. Existing standards are relatively simple and an innovative approach is required to extend these to incorporate VPH simulations. This paper reports the definition of a development process for the Education Engine and highlights existing tools that are available to support the exposure of VPH research outputs within a Medical Education context.

Materials and Methods

The use of Virtual Patients (VP) is increasingly being adopted within healthcare education as it provides supplementary automated teaching resources that can be flexibly accessed by the learner to practice clinical decision making in an interactive setting, independent from patient contact [1]. VP technology is well developed, with a defining ANSI standard and a number of mature software tools enabling VP generation and online exposure [2]. The VPH-NoE Education Engine has been designed to take advantage of these existing VP standards and tools. This strategy circumvents the need for dedicated tool development and will allow VPH research output to be exposed within a context that is already familiar to the clinical community.

The following tasks are critical to the success of the Education Engine:

- Specification of a standard for representation of Virtual Patient data that is flexible enough to address the full range of the VPH research domain
- Identification of tools for authoring of Virtual Patient packages capable of communicating with VPH tools
- Identification of tools for display of Virtual Patient packages containing VPH simulation output
- Identification of evaluation tools for assessment of the resulting Virtual Patients packages by relevant stakeholders (the VPH research community, the Medical Education community and the clinical community)

The main criteria in selecting tools for the VPH-NoE Education Engine were support of medical education standards (as MVP) and free of charge availability of the software.

The following section presents the outcome of effort to address each of these tasks.

Results

The standards and tools that have been selected to be used within the VPH-NoE Education Engine are summarised as follows:

- Standard for Virtual Patient data: *The ANSI MedBiquitous Virtual Patient* (MVP) standard has been developed to "enable interoperability, accessibility and reusability of Web-based virtual patient learning content" [3].
- Virtual Patient authoring tools: The *Bit Pathways* multipurpose e-learning resource editor provides a mechanism for the authoring of Virtual Patients and can export resources directly into MVP format [4].
- Virtual Patient player: The *OpenLabyrinth* open-source software provides functionality to host MVP resources and provide secure online access to view Virtual Patients through a client web browser [5].
- Evaluation tools have been divided into two categories: addressing technical issues of the produced VP packages (XSLT Test Suite of MVP packages [6]) and user surveys into the value of educational content and learning design of the VP packages.

To provide an accessible mechanism to define these MVP elements, the mapping between VPH project output and MVP structure is achieved by providing the following information in each VPH domain:

- A network structure to define the learning pathway - this controls the sequence in which information is presented to the learner and allows learner decisions to define branches in the pathway. This is broadly equivalent to the MVP *activity model (AM)*.
- Learning resource content associated with each component of the pathway - this comprises the text, images and other media files which form the information presented to the learner. This combines elements of MVP *Virtual Patient data (VPD)*, *Data Availability Model* (DAM), and *Media Resources (MR)*.

Examples of generic learning pathways, illustrating particular aspects associated with VPH simulation output, are shown in figure 1.

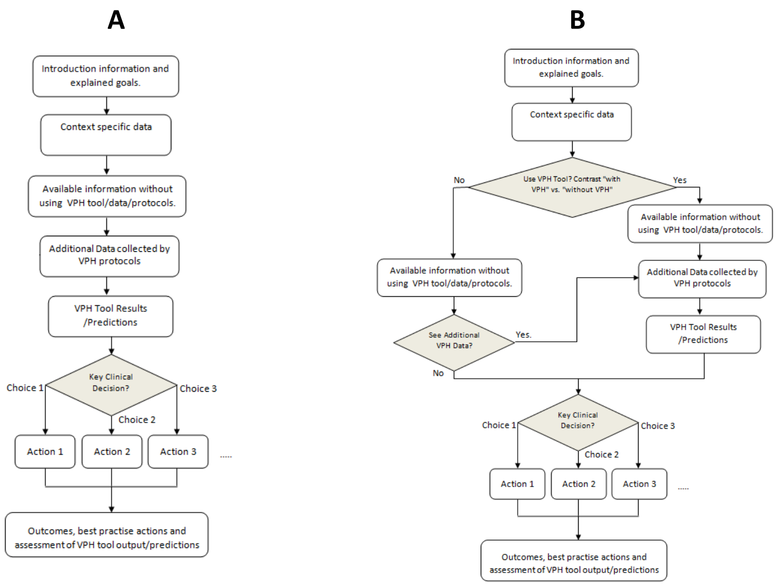

Figure 1. Networks (A) and (B) show two simple generic pathways, which highlight the added clinical value of use of VPH tool output and protocols. Network A presents VPH tool data in a sequential context whereas B presents the same data using decision branching to implement a comparative structure, allowing greater learner interaction.

The subtlety of designing suitable learning pathways that are capable of capturing both clinical knowledge and the additional value afforded from VPH tools and results will be realised through multiple phases of collation of VPH project outputs, resource re-authoring and content refinement.

To aid the initial phase of this effort, a structured Power Point template has been developed which describes a template for a generic Virtual Patient and can be translated into an MVP format using *Bit Pathways* software. This generic Power Point template provides a user-friendly bridge to the formal output required by the MVP standard. Each component of the learning resource content is defined as a single PowerPoint slide. Once Power Point content has been translated to the *Bit Pathways* software, further modification to the learning pathway can be undertaken directly within *Bit Pathways*. Thus, learning pathways can be easily re-arranged to optimise the presentation of the educational resource.
The generic Virtual Patient has been designed to include basic decisions, enabling the learner to choose whether or not to interact with VPH data and results before undertaking clinical decisions. The full process of Virtual Patient exposure has been undertaken using this generic Virtual Patient including translation to an MVP package and exposure within a dedicated instance of the OpenLabyrinth Virtual Patient player.

Conclusion

Progress towards realising the VPH-NoE Education Engine has been made through adoption of Virtual Patient (VP) standards and existing software tools. An initial specification and generic VP template has been developed and employed to facilitate contributions from VPH research projects and to implement testing of the supporting software tool chain.
A subsequent phase of development will be undertaken to extend the educational context of the resources through a cycle of evaluation and refinement, with contributions from the Medical Education, clinical and VPH domains. It is expected that that this work will progress rapidly, producing substantial demonstrable output by September 2012.

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