A Collaborative Approach Enabling the Building of Virtual Patient Cases for Medical Education in Sub-Saharan Africa

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Definition:
- "an interactive computer simulation of clinical scenarios in real life for medical education, learning or assessment".

Objective:
- To improve clinical reasoning by competency based learning

Key elements of virtual patient activity:
- the role of care providers assigned to the learner
- the use of information technology
- the progress of clinical case scenario based on users’ inputs
- The complexity of virtual patient is critical for its adoption
  - Large workload
  - Huge resources
**Developed countries: significant progress of virtual patient**
- The exponential growth in student numbers
- The limited access to patients
- The need to structure and standardize medical education

**Developing countries, especially in Africa:**
- Description of some experiences at the experimental stage
- Demonstration of relevance of the use of virtual patient for training or learning

**Development of a new virtual patient system: VIPS 2.0**
- To enable the collaborative production of virtual patient cases
- To enable to play them even without an Internet connection

**Aim of the study:**
- **To describe the results obtained during the first development step**
- **To elaborate some perspectives for its optimization**
Based on Computerized Patient Simulator named VIPS 1.0

- Stand-alone web application
- Main educational activity: Medical consultation + Feedback + Evaluation
- Paradigm: “Blank sheet”, “Reflective practitioner theory”
- Medical ToolBox
  - Contains all sections of a medical consultation
  - Item (questions) response: Noise Vs Signal

Technologies used for VIPS 2.0:

- Editor: PHP 5.3, MySQL, XHTML, Ajax, etc.
- Player: C library
- Methods

- Development of VIPS 2.0 in three stages
  - Design, selection of technologies and construction of the relational database
  - Data migration (CSV) from VIPS 1.0 to VIPS 2.0
  - Development of VIPS 2.0:
    - VIPS Editor 2.0: production of virtual patient cases
    - VIPS Player 2.0: execution of virtual patient cases
Data Model of VIPS 2.0

- Item list
- Noise Responses
  - Category (ICPC-2)
  - Constraints (age, Gender)
  - Delay, etc.

- Signal Responses
  - Scores
  - Improvement, etc.

- Demographic data
  (name, age, sex)

- Narrative Data
  (complaint, diagnosis, feedback)

VIPS Editor 2.0
- Web application
- Interactions with the Database: SQL Queries
- Management of Virtual Patients cases: edit, modify, delete, export

Components of VIPS 2.0
VIPS Player 2.0
- Stand alone, online or offline application
- Conversational Interactions (natural language) + GUI
- Topology of data access: branched
- Authentification and Tracking of users’ performances

Topology of the activity on VIPS Player 2.0
(VPD: Virtual Patient Data; MR: Media Resources)
Main technical challenges of VIPS 2.0

- Database and Editor
  - Integrity of the database items
  - Coherence between the available data (during the consultation) and the clinical scenario
  - Possibility to enrich VIPS system with new information
  - Collaborative production

- Player
  - Not dependence from the Internet
  - Interoperability of VIPS cases with other Virtual Patient Systems

Some technical solutions are already implemented

- Integrity rules: unique identifier, additional constraints (age, gender)
- Use of precision rules
- Web application
- Export functionality
Collaborative management of virtual patients cases

- For adoption of Virtual Patient in resources-limited countries
- For a large-scale production of Virtual Patient cases
- For the improvement of the quality of produced Virtual Patient cases
- For updating these cases in accordance with the knowledge evolution
Key conditions for collaborative management of virtual patients cases

- **Technical aspects**
  - Development of tools for shared and distant production of virtual patient cases
  - Monitoring of the activities
    - Tracking and checking of the editing processes
    - Alert systems
    - Tools for the maintainance and the evolution of knowledge base
  - Improvement of interoperability: SCORM Standard?

- **Human aspects**
  - Practice community in the field of virtual patient
  - Basic training on virtual patient: concept, use and tools
  - Establishment of recommendations
  - Committee of validation: reviewing and validation of virtual patient cases
- VIPS 2.0 is a functional solution
  - Some technical functions are already implemented
  - Others still need to be implemented
- Adoption of the virtual patient as a component of medical education in Africa remains a challenge.
- Implementation of a collaborative approach according to technical and human aspects seems to be a key element in which the future developments should be focused.

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