

Responsive Virtual Human Technology for Pediatric Training

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Abstract:

New horizons: Responsive virtual human (RVH) technology for pediatric training

- **Objective:** Training and assessment in pediatrics is complicated by the poor reliability of children to behave in a consistent manner. Consequently, curriculum is difficult to develop, performance assessment is restricted, and practice opportunities are limited. Technology advances are beginning to offer possibilities. Our goals have been to develop specific interactive training sessions using virtual pediatric characters and to explore educational issues related to using RVH training.

➤ **Methods**: A team of developers at RTI International has been working with content experts in pediatrics, linguistics, and cognitive science to develop responsive pediatric characters. RVH character development utilizes natural language processing, virtual reality, and behavior modeling, enabling characters to behave specific to different situations. In other words, RVHs respond to a learner's verbal strategies with defined cognitive, psychomotor, and verbal responses. Pediatric interactive situations were created and shown to content and educational experts.

➤ **Results**: Specific RVH pediatric interactive situations have been developed to include: 1) obtaining an ear exam in a 4 year old; 2) examining the lungs of a 10 year old; and 3) obtaining a high-risk behavior history from a teenager. Content and educational experts believe that pediatric RVHs may provide new educational opportunities. Educational issues have surfaced to include defining pediatric interactive strategies, program validity, scoring performance, and providing feedback.

➤ **Conclusion**: New horizons in educational technology are emerging that should increase learning opportunities in pediatrics but that will require focused attention to educational issues. We will want your input!

Introduction and Background

Educational Issues and Needs in Pediatric Medicine

➤ Instruction:

- Limited exposure to children
- Limited one-on-one faculty observation time
- Limited curricular material: mostly passive learning
- Limited practice opportunities
- Variable experiences with behaviors or problems
- Dispersed learners



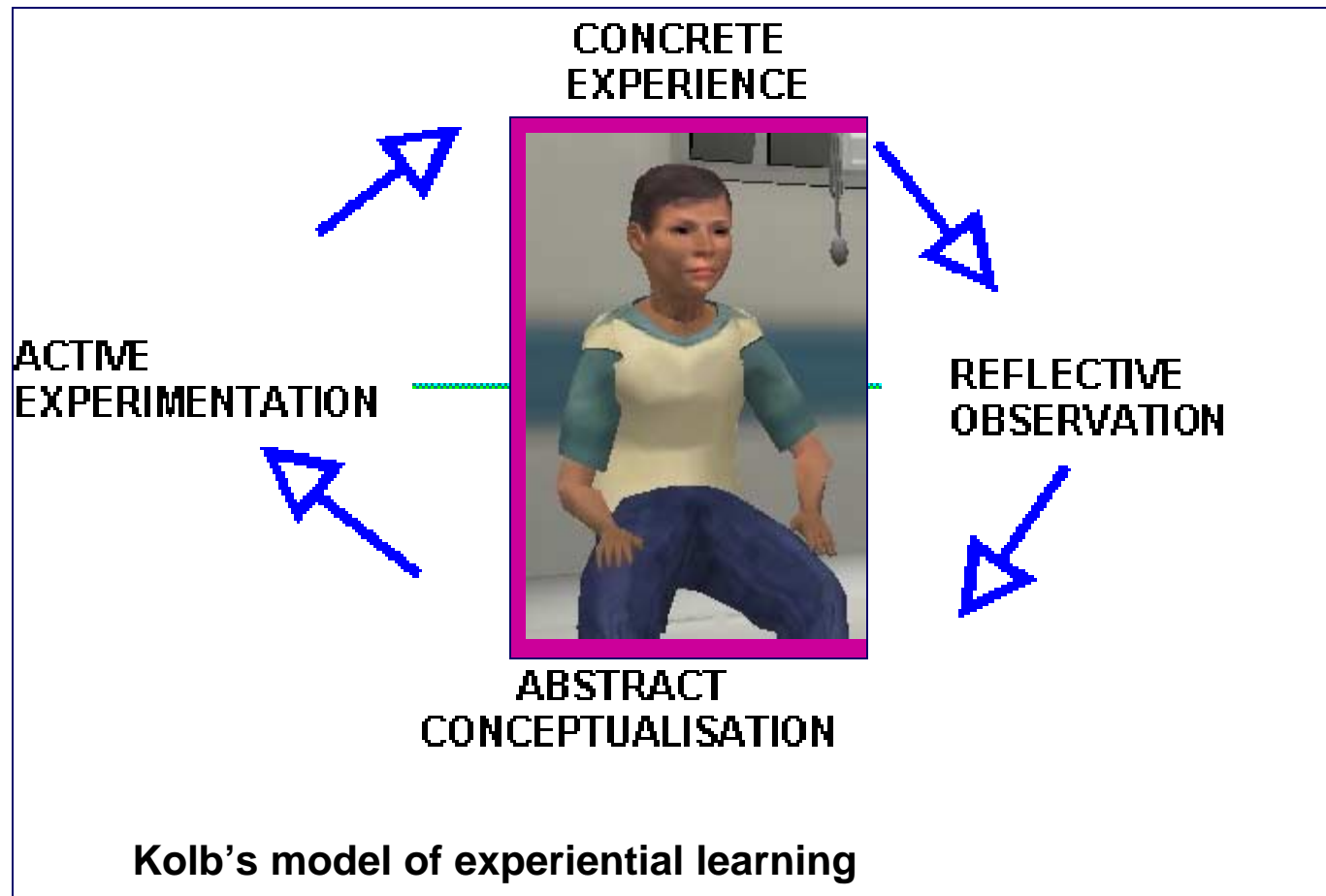
Introduction and Background

Educational Issues in Pediatric Medicine

- Assessment: No reliable / valid authentic assessment in young children (Standardized Patient).
 - Pediatrics may not be included in assessment
 - Assessment is less authentic: text based or multimedia videos
 - Interaction skills with children may not be valued by the learner

Introduction and Background

➤ Learning Theory



Learning Pyramid

Average Retention Rate*

5%

Lecture

10%

Reading

20%

Audio-Visual

30%

Demonstration

50%

Discussion Group

75%

Practice by Doing

90%

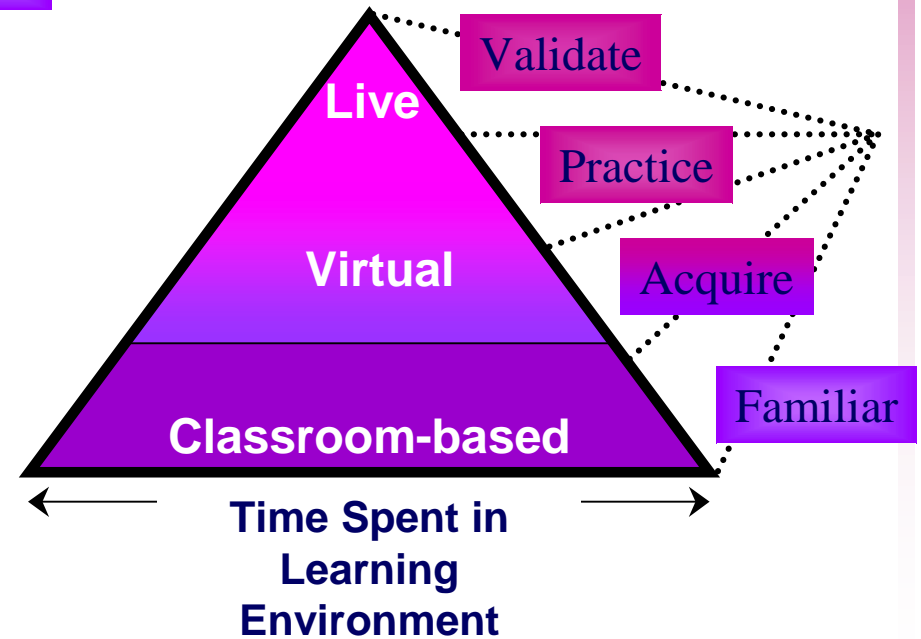
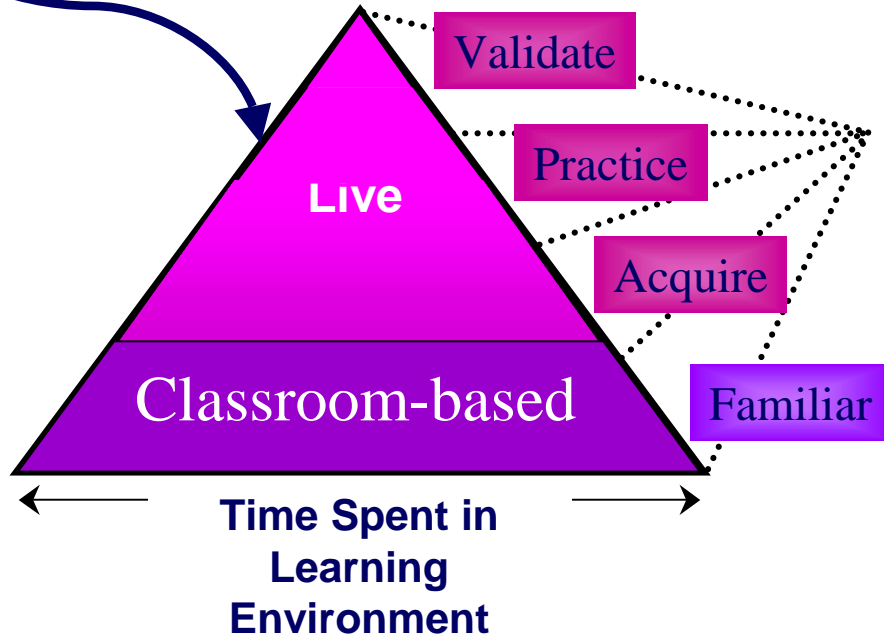
Teach Others

*National Training Laboratories - Bethel, Maine

Traditional Training vs Technology Assisted Learning

- **Traditional Learning**
- Classroom: didactics, discussions, rounds
- Live - on the job:
 - Seeing Patients
 - Variable feedback
- **Technology Assisted Learning (TAL)**
- Proactively apply the benefits of technology to help people train more safely, learn better, retain skills longer, and achieve proficiency less expensively.
- Virtual Added: Experiential learning

Traditional Training vs Technology Assisted Learning



METHODS

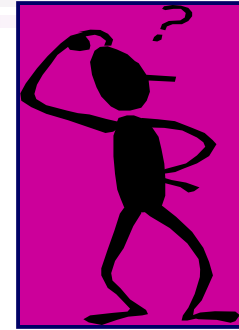
- Development of Responsive Virtual Human (RVH) technology for pediatric training
- Development team: RTI International, content experts in pediatrics, linguistics, and cognitive science.
- Development of Responsive Virtual Human, virtual environment, and prototype scenarios
- Evaluate prototypes

What is a Responsive Virtual Human?

- Intelligent agent that behaves naturally in a given situation
- Responds to natural dialog, not pre-selected
- Body movement, facial expression, gesture is appropriate to mental, emotional, physical state
- Choice of verbal response is contextually appropriate



METHODS : Evaluate Prototypes



- Goal is to provide:
 - information for gold standard setting,
 - language acquisition to improve robust nature of interaction,
 - address face, content, and construct validity.
- Hypothesis:
 - User interface can be navigated easily.
 - RVHT can be an acceptable learning experience.
 - Novice and expert users will provide valuable development information about language and strategies in these scenarios.
 - Differences will exist based upon expertise with children and technology experience.

RESULTS

- Prototypes have been developed
- MUCH to be learned Educationally!
 - Goal standards for strategies?
 - What technical fidelity is required for learning ?
 - Scoring and feedback strategies?
- MUCH to be learned Technologically!
 - Language processing
 - Modeling children
 - Multiple RVHs in one scenario

RESULTS : prototypes

- Specific Task - complete an examine of the ears



RESULTS : prototypes

- Specific Task - complete an examine of the lungs



RESULTS : prototypes

- Specific Task - complete an adolescent social history



RESULTS

- We need you to help us learn - PLEASE!



- Data collected anonymously from novice and experts
- IRB Approved
- Please give our RVHs a try this weekend!

CONCLUSIONS

RVHT might enhance student learning by:

- using numerous age-appropriate scripts for more practice,
- interacting with different virtual characters: gender/age/ethnicity/personalities,
- creating opportunities to replay interaction and try again (experiential learning),
- standardizing responses of virtual characters

CONCLUSIONS

RVHT might enhance student learning by:

- building strategies for best practice into training interaction,
- using active learning principles,
- tracking all interactions with RVHs for use in feedback, guidance, and assessment,
- providing consistent and transportable learning to dispersed learners

CONCLUSIONS

- Responsive Virtual Human Technology (RVHT) is in its infancy but may offer new and promising opportunities for learning and assessment in pediatric medicine
- There is much to be learned by educators and developers