Learning lab day

INRIA PARIS, 11/16/2016

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Kidlearn Project Objectives

• Personalize of teaching sequences in Intelligent tutoring systems

• Identify the current level of students

• Choose online the activity that better addresses the challenges for each student

• Improve motivation and engagement
Methods

- Flow theory and Zone of proximal development
- Use of multi-armed bandit algorithms to manage pedagogical sequences.
- Activities proposed based on the evaluation of the progress of the learner
Zone of Proximal Development and Empirical Success

Inside the zone of proximal development choose exercises stochastically according to the learning progress.

\( \delta_{ZPD} \): ZPD success rate
\( \delta_{Ax} \): Ax success rate
\( \lambda_{ZPD} \): threshold to expand
\( \lambda_a \): threshold to deactivate
Inside the zone of proximal development, choose exercises stochastically according to the learning progress.
ZPDES

δ_{ZPD} \geq \lambda_{ZPD}

δ_{A1} \geq \lambda_a

δ_{ZPD} : ZPD success rate
δ_{Ax} : Ax success rate
λ_{ZPD} : threshold to expand
λ_a : threshold to deactivate

A1 A2
A3
A4
A5

A1 A2 ZPD
A3
A4
A5

A1 A2 ZPD
A3
A4
A5

Time
ZPDES

\[ \delta_{\text{ZPD}} \geq \lambda_{\text{ZPD}} \]
\[ \delta_{A1} \geq \lambda_a \]
\[ \delta_{\text{ZPD}} \geq \lambda_{\text{ZPD}} \]

\[ \delta_{\text{ZPD}} : \text{ZPD success rate} \]
\[ \delta_{A_x} : A_x \text{ success rate} \]
\[ \lambda_{\text{ZPD}} : \text{threshold to expand} \]
\[ \lambda_a : \text{threshold to deactivate} \]

Time
ZPDES

\[ \delta_{ZPD} \geq \lambda_{ZPD} \]

\[ \delta_{A1} \geq \lambda_{a} \]

\[ \delta_{ZPD} \geq \lambda_{ZPD} \]

\[ \delta_{A2} \geq \lambda_{a} \]

\[ \delta_{ZPD} : \text{ZPD success rate} \]

\[ \delta_{A_x} : A_x \text{ success rate} \]

\[ \lambda_{ZPD} : \text{threshold to expand} \]

\[ \lambda_{a} : \text{threshold to deactivate} \]
Application tested in Aquitaine

- 11 schools
- 18 classrooms
- 400 students
- 4 activities
- 45 minutes per student

- 3 types of sequence manager:
  - Predefined sequence
  - ZPDES
  - RiARiT
Some results
Current developments

- Using of the algorithms in Kidbreath
- Development of a project with Harvard to test new algorithms which use features and context about the activities and the learner
KidBreath Context

• Asthma: 1st chronic disease in children → 10%

• Only 50% are adherent

• Factors influencing disease behavior
  • Disease knowledge → personalized
  • Self efficacy → illness perception & coping
  • Motivation
KidBreath Project

Web application with learning activities linked to asthma
- Transfer of learning optimization algorithm in chronic disease context
- Parameters?

Use of Therapeutic Education Programs criterias established by High Authority of Health

Gamification, participative design & user tests to validate contents
## Contents

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<th>Symptômes (2)</th>
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**TOTAL : 166**
Preliminary Study

- 1 class of 20 pupils aged 8
- 3 asthma kids
- Use of KidBreath during 3x20min on a week
- 2 conditions: choice VS no choice condition

Results:
- Strong usability rate
- +50% increase of disease knowledge
- Strong motivation to continue, especially for asthma kids
Further Study

▪ At home - daily life usage

▪ Learning asthma in autonomy more efficient? (VS without algorithm VS TEP)

▪ Motivation?

▪ Illness perception?

▪ Adherence? (treatments, accidents, avoiding factors … )
In Progress

- Methodology in participative design

- In global learning context:
  - Which others parameters taking account to integrate it in algorithms?
  - Transdisciplinary approach to improve learning paths in ITS (evaluation of frustration, cognitive load)?
Thanks for your attention!