The Design Science Perspective on e-Health Applications for Re-learning Purposes

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Our loosely coupled group focuses on e-health from various perspectives. The foundation is that the context has a combined health approach, whether on a general level or more specific, such as stroke rehabilitation. The health approach is always combined with digitalization in some ways, whether it is software or hardware, like an information system or communication sensors. Added to this can be systematic processes, such as stakeholders’ value.

We are always interested in further networking. Please approach us at karin.ahlin@kau.se
Background

Traditional relearning systems require a large number of clinical staff and are difficult to deploy because of high running costs. One solution is the design of Technology Enhanced Systems (TES), which have been recognized as highly useful for several treatment types when the TES are based on relearning approaches focused on adults with chronic diseases.

Recent studies highlight that different types of TES can be useful for relearning, combining various categories of technologies, such as: tele-relearning based on audio and videoconferencing, Internet-based therapy, serious game-based therapy and Virtual Reality based therapy.

Recent research studies have found that most adults prefer to rehabilitate in place, and that policy makers similarly favour this idea, but also that contextual and psychosocial factors must be carefully explored if TES can result in a beneficial impact.
Technology Enhanced Systems

The global population is increasing significantly and therefore more medical and social services will soon be needed, designed to support adults. Traditional relearning systems require a large number of clinical staff and are difficult to deploy because of high running costs.

One solution is the design of Technology Enhanced Systems (TES), which have been recognized as highly useful for several treatment types when the TES are based on relearning approaches focused on adults.

Some TES have been repurposed learning systems designed for children; these are typically less useful. Effective approaches cannot be based on learning principles for children but must be based on andragogy (adult learning theory), which can be refocused for relearning and training.
Adult learning and re-learning

Based on andragogy, which means the method and practice of teaching adult learners [1].

The fundamentals for adult learning are:
1. The adults need to know
2. Self-concept
3. Learning from experiences
4. Readiness to learn
5. Orientation to learning
6. Internal motivation
Knowles’ Adult learning theory

The adult learning theory (andragogy) highlights that adults tend to learn differently than traditional children's education that is usually referred to as pedagogy [1].

Knowles et al. [1] suggested that adults should actively participate in the planning, development, and implementation of the learning process.
Andragogy in practice

Model

1. Learners Need to Know
   - why
   - what
   - how
2. Self-Concept of the Learner
   - autonomous
   - self-directing
3. Prior Experience of the Learner
   - resource
   - mental models
4. Readiness to Learn
   - life related
   - developmental task
5. Orientation to Learning
   - problem centered
   - contextual
6. Motivation to Learn
   - intrinsic value
   - personal payoff

Source: [1]
Design Science Research [2]
Problem Statement [2]

Investigating and analysing practical problems
Precisely formulated problem
Be of general interest
Significant for some practice
Underlying causes may be identified and analysed
Can address radical innovations with no specific problem stated
Problem Statement – example

General problem (see, e.g., [3], [4])
   Older population
   Rehabilitation at place
   Favoured by policy makers

Significant problem (see, e.g., [3], [4])
   Few softwares for stroke patients are designed using the knowledge of the speech therapists
   Few softwares for stroke patients in native languages, such as Swedish
Define requirements

Outline a solution to the explicated problem [2]
Viewed as a transformation of the problem into demands [2]
Should be defined for functionality, structure, and environment [2]

Who is the stakeholder? [6]
Ethical considerations [6]
Define requirements [3], [6]

Systematic processes
Individualized learning plan
Consider users’ previous practices and knowledge
Involvements of relatives and friends
Individualized technical requirements
Usability of graphical interface
Personal integrity
Technical stability
Development of prototype [2]

The development of the artefact should create an artefact that addresses the explicated problem
The prototype should fulfill the defined requirements
It includes determining the functionality and its structure
Speech and Language Assessment System (A-ning) Overview
The assessment and implementation process: Patient’s page [4]
The assessment and implementation process:
*Speech therapist’s page [4]*

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Papper-pen and digitized TES [4]
Demonstration [2]

Uses the developed artefact in an illustrative or real-life case
The goal is to show if the artefact can solve an instance of the problem
Evaluation [2]

How well the artefact fulfills the requirements

To what extent it can solve the practical problem
Evaluation

Based on pre-defined requirements, functional evaluation
Based on a specific model, e.g., Knowles’ model or adult re-learning [5] or UTAUT (Unified Theory of Acceptance and Use of Technology) [4]
Discussion

The users needs to require a digitized artefact
Understanding who is the user in focus
The ethical concerns related to the user
The user in focus while gathering requirements and designing
Use professionals’ knowledge while designing
Pre-determine the evaluation factors
Communicate in favour of users, professionals, and policy makers
References


