

User requirement analysis of social conventions learning applications for non-natives and low-literates

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Abstract. Learning and acting on social conventions is problematic for low-literates and non-natives, causing problems with societal participation and citizenship. Using the Situated Cognitive Engineering method, requirements for the design of social conventions learning software are derived from demographic information, adult learning frameworks and ICT learning principles. Evaluating a sample of existing Dutch social conventions learning applications on these requirements shows that none of them meet all posed criteria. Finally, Virtual Reality is suggested as a possible future technology improvement.

Keywords. Social conventions, adult education, ICT learning, low-literates, non-natives, situated cognitive engineering, virtual reality, mixed reality.

1 Introduction

In current society, people are expected to be independent, self-directed problem solvers: they should either be able to solve their own problems or at least know where to go for help. For non-native citizens and people of low literacy, this can be hard. They lack knowledge and language skills required for satisfactory participation in society, possibly combined with low self-efficacy, little social engagement and poor security awareness. These people would benefit from ICT support to acquire and apply the relevant social convention knowledge and skills in their neighbourhood.

Becker and Mark (1998) define social conventions as the normative rules of conduct in a social system, which are adhered to by group members even when acting otherwise is possible. The envisioned support distinguishes between norms-and-rules and language aspects.

First, the ‘norms and rules governing social participation’ aspect indicates knowledge of the appropriate and accepted ways to act in modern society, including behavioral rules and guidelines for interacting with other people. For the non-native

demographic, cultural difference can make these rules unclear; for the low-literate demographic, information density and complexity can surpass their ability to cope.

Second, the ‘language’ aspect of social conventions refers to the ability to effectively communicate in and participate in modern society. In particular, this project is interested in the communication problems incurred by situated language complexity mismatches, where the complexity of the language used exceeds the level participants are comfortable with. For the non-native demographic, a certain degree of language acquisition might be useful, though the primary focus will be on improving effective communication; for the low-literate demographic, effective learning could focus on increasing comfort and reducing shame in indicating low literacy.

As a first step in the development of computer support for social convention learning, this paper has two main research questions: Are existing social conventions learning applications well-suited for teaching non-natives and low-literates? And in what ways can they be improved?

This study will use the situated Cognitive Engineering (sCE) method (Neerinx & Lindenberg, 2008), which integrates human factors knowledge into the technology development process; figure 1 shows a schematic overview of the sCE methodology. The following sections will follow the ‘boxes’ shown in the figure: Sections 2 to 4 set the foundation (describing operational demands, human factors and technology) while Section 5 provides a requirements analysis (specification) and a corresponding first evaluation of current applications.

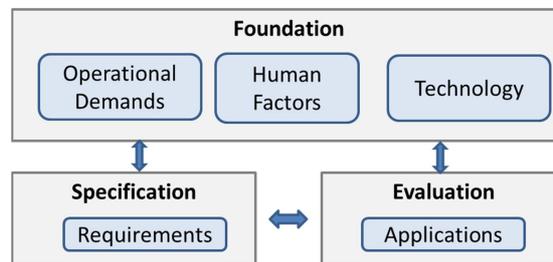


Fig. 1. situated Cognitive Engineering method (Neerinx & Lindenberg, 2008).

2 Operational Demands

Literacy is measured on a continuous scale, ranging from 0 to 500. In the Netherlands, five levels have been defined: level 1 (0 and 225) indicates that a person is low-literate (Steehouder & Tijssen, 2011). The Organisation for Economic Co-operation and Development indicates level 3 as the minimum level required for active participation in a knowledge-based society (‘functional literacy’). This level is the international benchmark, and it is associated with economic independence and increased participation in society and life-long learning (Murray, Kirsch & Jenkins, 1997).

There are currently 1.1 million level-1 low-literate people between the ages of 15 and 65 living in the Netherlands; this number is quite stable. (Houtkoop et al, 2012). 69% of these low-literates are native citizens. Low literacy does not imply a lack of ICT skills: Many low-literates have computer and Internet experience at home and at work. Only about 6% of the labor force has ‘never used a computer before’. (Houtkoop et al, 2012).

A ‘non-native citizen’ is ‘a person of whom at least one parent was born abroad’ (Keij, 2000). In 2011, 20.6% of the Dutch population consisted of non-native citizens: 9.2% western migrants, 11.4% non-western. The subset of western migrants has grown by 11.8% since January 2000, owing mostly to immigration; non-western migrants have increased by 34.8%, largely due to natural population growth (Gijsberts, Huijnk & Dagevos, 2012).

Within the context of this study, extra attention is afforded to two specific sub-groups: the non-native 55+ elderly, and non-western 45+ migrant women. Currently, 4% of all 55+ elderly living in the Netherlands fit the ‘non-native’-description (7% in 2025). This group will run a high risk of social isolation over the next decade: their retirement imply loss of social contacts and income, exacerbating the existing problems caused by low education and a poor grasp of the Dutch language (Mertens & van der Zwet, 2009). Furthermore, the non-native elderly show a relatively high degree of depression and social seclusion, yet take less advantage of healthcare services like home care. Factors at play here are both different wishes and perceived needs regarding healthcare (den Draak & de Klerk, 2011) and a cultural focus on informal care by relatives; coming generations of migrant children are expected to put less stock in the notion of ‘caring for elderly relatives’ (Mertens & van der Zwet, 2009).

About 155.000 non-western 45+ women were found living in the Netherlands in 2006, and this number is growing. Turkish and Moroccan 45+ women perform less paying work and subsist on benefits more than native 45+ women (den Draak & de Klerk, 2011). Over 80% of Turkish and Moroccan women has no degree, and around 66% of elderly Turkish and Moroccan women are functionally illiterate (Mertens & van der Zwet, 2009).

73% of Turks and Moroccans has home access to a computer, 47% of Turks/ Moroccans lacks an internet connection at home, 18% regularly uses a computer at work, and 43% indicates ‘feeling like an outsider’ when ICT and computers are discussed (91%, 16%, 50% and 17% for native Dutch citizens) (Bijl & Verweij, 2012).

3 Human Factors

Adult learning principles. Merriam (2010) outlined four major theoretical frameworks of adult education that jointly offer an encompassing overview of the attributes of adult learning: andragogy, self-directed learning, transformative learning and situated cognition.

The theory of *andragogy* distinguishes six characteristics: adults are self-directed learners (1), driven by real-life problems (2), internal motivations (3) and societal roles and demands (4), who want to know why they should learn anything they are told to learn (5) and possess accumulated life experience to draw on (6). These characteristics offer clear and simple guidelines for adult education (Knowles, 1984).

Self-directed learning is a theory of adult education that is based on adult learners willingly engaging in learning of their own choice (Tough, 1971). Self-directed learning is connected to informal learning, which distinguishes between three learning styles: formal learning is structured and standardized, non-formal learning is structured but unstandardized, and informal learning is both unstructured and unstandardized (La Belle, 1982). While self-directed learning can be found in instances of every learning style, it is most often encountered during informal learning.

Transformative learning involves altering frames of reference. Illeris (2010) contrasts transformative learning with assimilative learning (which keeps frames of reference intact) and accommodative learning (which involves restructuring frames of reference). Transformative learning requires the learner to engage in critical self-reflectivity. Mezirow (2000) offers a ten-step list to describe the process of transformative learning, from 'a disorienting dilemma' to 'a reintegration into one's life on the basis of conditions dictated by one's new perspective'.

The main notion of situated cognition is that the context in which the knowledge is presented is as much a part of learning as the information content: context includes the physical learning location, the tools used and their method of use, and the social interactions (Brown, Collins & Duguid, 1989). Studies have also suggested that affective dimensions and emotions form an important element in the context of learning (Merriam, 2010).

Applying these four frameworks to the problem definition outlined earlier, a number of attributes necessary for social conventions learning programs can be derived:

1. There is no 'the adult learner', and no single curriculum can fit every student. A successful social conventions learning program must be adjustable to take different learning styles into account, offering guided 'teacher-directed' options and self-directed 'student-directed' ones.
2. Social conventions learning can be a volatile, culturally charged topic. A social conventions learning application needs to recognize and ameliorate this volatility, by using non-confrontational language and examples and demonstrating cultural awareness.
3. Brown, Collins & Duguid (1989) suggest that knowledge is influenced by the learning environment; as such, learning should take place in an environment as close to the learners' real-life environment as possible. A social conventions learning application must be able to create such an environment.

ICT learning principles. Richards's (2005) topology of meaningful ICT learning activities describes three characteristics vital to ICT-learning: the provision of and dissemination of information, the possibility and facilitation of worldwide communication, and the element of interactivity.

'The provision of and dissemination of information' refers to the notion that ICT learning offers a wide range of media and information types. This breadth of possibility makes it easier to adapt elements of a learning application to individual learners' preferences. Low-literates, for instance, could benefit from an implementation focusing on audio/video and simple text, while language-specific subtitles and cultural elements such as avatar ethnicity and dress style could be provided for the non-natives. Additionally, use of the Internet allows learners to look up and access self-chosen materials, supporting self-directed learning from home.

The availability of constant worldwide communication allows teachers and students to stay in contact beyond traditional regulated classroom hours. This opens up venues for directed, personalized support, which is vital in ICT-learning: Nielson (2011) reports high rates of failure in at-home language learning without proper support. Furthermore, it can be argued that the near-total dissemination of ICT use in Dutch society (van Deursen and van Dijk, 2011) has made 'the proper usage of ICT communication tools' an important social skill. As it's suggested that non-natives may be restricted in their home access to ICT and the subsequent user experience (Driessen et al, 2011), an ICT-based social conventions learning application could serve a dual purpose in acquainting the users with ICT communication norms.

The element of interactivity, finally, links ICT learning to notions of experiential learning (Kolb, 2001). Barak (2006) divides learning into four aspects – contextual, active, social and reflective – and reports that the use of ICT enhances the contextual and active parts of learning, tying the interactivity of ICT learning applications to both experiential learning and situated cognition.

One example of ICT learning that demonstrates the effectiveness of interactivity is in educational games. Playing digital games is seen as a form of experiential learning (Kiili, 2005), and Doshi (2005) claims that using gaming to teach skills allows students to fit otherwise abstract concepts into their daily lives. Additionally, educational games offer other benefits to learning: games are a conduit to experiential learning, games create and enhance engagement in students, games promote cooperation, and games could help students in digesting complex subject matter (Fengfeng, 2008).

Next to the experiential learning note, games are known for inducing engagement, immersion (Ermi & Mäyrä, 2005) and flow and fiero (Cornelissen et al, 2012). Both Dickey (2007) and Warren et al (2008) report that games induce intrinsic motivation in players. Gaming has also been shown to promote cooperation among school children (Facer et al, 2004).

The following ICT learning principles can be derived for the current project:

1. A successful social conventions learning program should be adaptable to the target audiences as much as possible. ICT's relative wealth of different media can and should be used to take the requirements of the target demographics into account.
2. Support is important in self-directed learning: study results indicate that proper use of support is necessary for success in self-directed learning (Nielson, 2011) and social conventions learning (Driessen et al, 2011). The use of ICT in this support seems a natural fit.
3. A successful social conventions learning program should be interactive, offering lesson plans and examples tailored to the target demographics' real-life situations and incorporating principles of experiential learning and situated cognition.
4. Gaming principles should be used to enhance motivation, immersion and flow.

4 Technology

Existing social conventions learning applications. The first literature review focused on applications for our main demographics: non-natives and people of low literacy. There is a specific class of social conventions learning software that is tailor-made for these groups: naturalization and integration courses that focus on both language learning and culture and participation (Driessen et al, 2011) and often handles both topics simultaneously. The investigation focused on seven Dutch naturalization software packages:

- **EHBN** is an older naturalization package that has been around since the 1990's. The website claims that it uses a 'CD-ROM program', and that the 'entire course is now web-based'. Targets non-natives and is intended to support naturalization. (Dutch national social conventions (DNSC), Dutch language learning level A2)
- **IJsbreker Plus** is a language learning naturalization aid for non-natives. It combines independent online work with book exercises and classroom teaching: the website claims to offer a 'strong mix of learning types'. (DNSC, level A2)
- **ETV.nl** and **Oefenen.nl** are two websites that offer a large selection of training programs: ETV.nl acts as a webshop, while Oefenen.nl hosts the training software. Offered are language learning segments aimed at low-literates and naturalization courses aimed at non-natives. (DNSC, various levels)
- **KNS Examen** is the website of the official Knowledge of Dutch Society naturalization exam. **KNS Examentraining** is an online training exam. The KNS Examen targets non-natives. (DNSC, level A2)
- **Naar Nederland** is 'the official self-study guide for the Dutch naturalization exam'. The method works with a DVD, several books and online practice software; the complete package is offered in 18 languages. (DNSC, level A1)

- **Nu in Nederland** is an online social conventions learning package that prepares students for the official KNS exam. It uses the eight main ‘themes’ of the KNS exam as a guideline, and claims to work with ‘texts, questions, hyperlinks, movies and exam questions’. (DNSC)
- **Samen op pad** is a free online learning package focused on language learning and naturalization. It uses highly simplified Dutch to increase accessibility for low-literates and non-natives. Uses video-supported multiple-choice questions and interactive Dutch-language matching exercises. (DNSC, undefined levels)
- **Thuis in Nederlands** is a multimodal teaching method aimed at older female migrants, using a mix of classroom book learning, practical assignments and roleplay and e-learning (including VR environment called the Virtual Neighbourhood). Has an additional language learning track called ‘Klaar voor de Start’. (A1 level)

Envisioned technology. Virtual Reality (VR) seem to provide opportunities to support social conventions learning. Huang, Rauch and Liaw (2010) describe VR as ‘a combination of 3D graphics and input devices that manages to create immersion in an interactive virtual environment’, which is already wide-spread. VR-supported learning seems to outperform other types of e-learning: interactive virtual environments allow students to see and directly interact with one another, creating a sense of social presence (Monahan, McArdle & Bertolotto, 2008). VR learning can confer greater feelings of physical and social presence and situatedness (Huang, Rauch & Liaw, 2010) and allows for intuitive, natural interaction possibilities, making it interesting for social conventions learning purposes.

5 Requirements analysis

Based on the demographic information and the human factors principles for adult learning and ICT learning, seven high-level user requirements were derived:

- **Req 1:** The application should offer and / or support different learning styles.
- **Req 2:** The application should be multi-modal, offering content in multiple concurrent ways.
- **Req 3:** The application should use learning materials and contents that are closely related to the learner’s physical environment and real-life experiences.
- **Req 4:** The application should use non-confrontational language and content and demonstrate cultural awareness.
- **Req 5:** The application should employ real interactivity to engage the learners.
- **Req 6:** The application should employ principles of interactive gaming, like flow and fiero, to engage the learners and promote intrinsic motivation.
- **Req 7:** The application should possess built-in support options.

The evaluation of the existing social conventions learning applications is presented in Table 1 with a summary of application attributes:

- **Target groups:** the intended target demographic(s) for this application: non-natives (non-nat) and/or low-literates (low-lit).
- **Goal: social conventions:** whether or not the application teaches social conventions.
- **Goal: language:** whether or not the application teaches language skills (including language levels taught).
- **Method(s)** employed by this application: books, websites, CDs, and classroom learning.
- **Req 1 to Req 7** indicate the seven requirements listed above.

Table 1. Evaluation of existing applications on attributes and criteria.

Method/ Criterium	EHBN	IJs- breker plus	EVT.nl	KNS examen	Naar Neder- land	Nu in Neder- land	Samen op pad	Thuis in Neder- lands
Target groups	Non-nat.	Non-nat.	Non-nat; low-lit.	Non-nat.	Non-nat.	Non-nat.	Non-nat; low-lit.	Non-nat.
Goal: social conventions	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.	Yes.
Goal: language	Yes: level A2.	Yes: level A2.	Yes: level unclear.	Yes: level A2.	Yes: level A1.	No.	Yes: level unclear.	Yes: level A1.
Method(s)	Book. CD. Web.	Book. Web. Class.	Web.	Books. Web.	Books. DVDs. Web.	Web.	Web.	Book. Web.
Req 1	No.	Yes.	No.	No.	Yes.	No.	No.	Yes.
Req 2	Yes.	Yes.	No.	No.	Yes.	No.	Yes.	Yes.
Req 3	Yes.	Yes.	Yes.	Yes.	Unclear.	Yes.	Yes.	Yes.
Req 4	Yes.	Yes.	Yes.	Yes.	Unclear.	Yes.	Yes.	Yes.
Req 5	Unclear.	Yes.	No.	No.	Yes.	No.	Yes.	Yes.
Req 6	No.	No.	No.	No.	No.	No.	No.	Yes.
Req 7	No.	Yes.	No.	No.	Yes.	No.	No.	No.

Table 1 shows that none of the applications meet all requirements. While most applications fulfill the demands for situatedness and non-confrontational content, the application of gaming principles and fully integrated support is rare. The IJsbreker Plus, Naar Nederland and Thuis in Nederlands applications each meet six out of seven requirements: it therefore seems plausible that these applications could be adapted to better fit this study's demands, although the specific nature of this adaptation is as-of-yet undetermined.

In general, there proves to be a mismatch between the existing technology and the obtained operational demands and human factors knowledge (see Figure 1). VR technology has some attributes that can help significantly in fulfilling the listed requirements. VR's main advantages lie in inherent multimodality, enhanced situated-

ness, greater possibilities for real interactivity and positive aspects of the gaming experience.

6 Conclusion

This paper investigated the current state of social conventions learning applications. Requirements were derived from theoretical frameworks in the fields of adult education (i.e., andragogy, self-directed learning, transformative learning and situated cognition) and ICT learning (interactivity, communication, information, engagement, immersion, flow and fiero. Seven requirements were derived from these frameworks: adaptability, multi-modality, situatedness, non-confrontationalness, 'real' interactivity, use of gaming principles and integrated support. An evaluation of current social conventions learning applications using the derived requirements revealed that none satisfy every requirement. Virtual Reality technology might help to better address the user requirements, by (among other things) making unwritten rules explicit and by taking away anxiety through repeated exposure and practice.

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