Teaching design students to reflect on ergonomics design for all user groups in society

Anna-Lisa Osvalder & Erik Ohlson
Division Design & Human Factors, Chalmers University of Technology
SE-412 96 Gothenburg, Sweden

Ergonomic design of products and environments affects human performance in everyday systems. Often the design is done with a general thought that the user group is normal distributed adults between 18-65 years (the traditional working force). However, human physical and mental prerequisites vary between people and also by age. Therefore, it is important to also accommodate the needs of small and big persons, persons living with various disabilities, expectant mothers, elderly, adolescents and children in the design. People with various disabilities can be for example wheelchair users, blind people and people with dementia. But to include all people in society when designing is not a simple task. Then we have to deal with extraordinary ergonomics, or inclusive design, which means taking into consideration various human characteristics and focusing on ergonomics for people that generally are excluded from common design guidelines.

A framework that deals with ‘Design for All’ has been developed at Chalmers University of Technology in Gothenburg, Sweden, and tested twice in a University course on master level for design engineering students. The aim of the framework is to identify what specific requirements different age groups and people with disabilities generate in various contexts and how these requirements create conflicts and challenges when trying to design for all. The framework consists of five parts:

1. A theoretical literature study of specific needs (physical and/or mental) associated with age and disability of the chosen user groups (elderly, children, physical impairment, impaired vision, impaired hearing etc.)
2. Observe the chosen everyday system (e.g. a public space or a workplace) to identify critical tasks to be performed and what contextual problems/hinder there for correct performance within the system. Perform unstructured interviews with people if appropriate.
3. Analyse the results from theory (specific needs for the different user groups) and practice (critical tasks and contextual problems) and make a list of problems followed by requirements for each user group.
4. Make a list of conflicts and contradictions between the requirements for the different user groups. Is there anything preventing a critical situation where the difficulties for all user groups can be supported?
5. Decide on the most relevant and feasible improvement areas for the system so it will be improved from a ‘design for all’-perspective.

The framework has been used when studying public spaces, more specifically the local public transport system, self-service restaurants and grocery stores. These are examples of everyday systems that should be accessible for everyone, i.e. all inhabitants of the society should be able to access functions here. The specific user groups studied were people with visual impairment, wheelchair users and elderly. A variety of critical tasks and contextual problems were identified within the public spaces, and a variety of design solutions were found, some of these rather simple.

For instance, in Gothenburg today, 40% of the busses and trams are not adapted to wheelchair-bound persons at all. Where there are solutions to board wheel-hairs, the access ramps are manual and an accompanying person is needed. The accompanying person needs to get a hook from the driver to fold the ramp, or the driver needs to do it. This is very time consuming and the time-schedule will be ruptured. Furthermore, there is too little space in the bus to fit an electric wheelchair together with for example a stroller. However, the students have proposed a number of interesting solutions on how people in wheelchairs could be included in the public transport system. They also showed how articles in grocery stores should be positioned to offer everyone a chance to reach them, and how restaurants should be furnished to avoid conflicts between user groups as wheelchair users and visually impaired people.

By using the framework, both theory and practice are used to analyse a system from a design for all perspective in a more structured way, which has been successfully done in student projects. This framework can also be used by various other stakeholders both in academic research and by practitioners to increase the possibilities to develop a more social and sustainable society.