

Enabling Fine Motor Impairment Through Design

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Despite the increasingly digital and fast-paced technological developments that enrich us as a society, the ability to express ourselves through written communication has become more important day by day. However, some are not able to utilize this skill to its full potential, as the ability to write may, in some cases, be hampered by a 'limitation' that affects motor ability. These limitations, such as arthritis or rheumatism, can limit mobility, and often impact the individual. Impacts, as such, may cause frustration and can influence one's perception of quality of life.

In this thesis, the importance of fine motor ability, and specifically, the ability to perform a certain daily activity that requires fine motor ability is addressed. Following from a preceding project that involved developing a writing tool for a limited individual, this thesis delved deeper into numerous limitations that can cause an individual to struggle with fine motor ability. The main research question that provided the scope of the design problem is as follows:

“How can a solution be designed that enables the performance of a frequently conducted daily activity in individuals with a limitation in fine motor ability due to syndromes or diseases?”

By exploring the aspects of the issue, studying the solutions that overcome certain hinderances within this activity on the present-day market, and progressing through a design process, a supportive product has been created. This product aims to serve as a supportive solution providing comfort, ease, and independence, of which its effectiveness will be tested accordingly.

To incorporate a deeper understanding of fine motor impairment, the method of 'co-design' has been utilized. This method entails the principle of designing with the target user in mind by designing *together with* the target user. In this way, the values and desires of the end user were kept in mind to the greatest extent possible. Through working with the co-designer and utilizing this design method, real-world experiences and qualitative testing have been incorporated into the design process.

Since this research may impact the participants involved, ethical design has been considered throughout the course of the thesis. This is signified by proper use of research methodology, reasoned design decisions, a user-centered approach and approval of certain terminology (burdened words

such as 'disability' being replaced by 'limitation', which additionally may be used for diseases and syndromes) by the co-designer.

The research involved several interviews, of which the most relevant interviews included two occupational therapists and a physiotherapist. Their expertise provided insight that guided the research process to be manageable within the given timeframe and with the scope in mind.

Following the research process, which was comprised of interviews, literature- and market research, the design process of the product was started. This design process involved an iterative process, where several developed ideations and concepts were turned into tangible test objects for the co-designer to review. Foam material was selected for the objects to allow for quick adaptations. The final prototype was developed and tested by selecting the most promising ideas. The results were highly promising, as can be viewed in the picture where the bottom word was written with the final product, called 'Noxtin'.

The final product introduced a different manner of gripping that aimed to induce control and comfort. By enlarging the contact area of the hand with the grip design, stress is relieved from the fingers. This allows an overall strain reduction in the hand and wrist, while still providing an agile, precise and controllable grip on the inserted (writing) utensil.

Although the final design solution turned out to be successful and promising, some aspects could have been taken on or performed differently. There was difficulty in incorporating exact measurements due to the organic design, which could make developing different proportions of the final product to accommodate different hand sizes difficult. Additionally, the prototype has been proven to be effective on a qualitative basis. To ensure the efficiency of Noxtin, the design may be tested quantitatively in the future through the use of a larger sample size.

In conclusion, the Noxtin has been proven successful on a qualitative level. However, to ensure that Noxtin is efficient for a larger sample group, the design product should be tested quantitatively with a larger testing panel.