Knowledge of ergonomics concerning work with VDU to avoid ill health on the threshold of information era

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Students who use visual display units at home and in offices up to four hours daily and up to full time daily work were studied. The respondents were classified on the basis of daily work hours and claimed health discomforts. Only those who work at offices had three complaints independent of the time worked. All the received data pointed to the necessity of the ergonomics course to improve the awareness source about of complaints.

1. Background

In today's working environment the number of people working with VDUs (Visual Display Units) has been increasing rapidly. In Estonia using a computer more than five days a week the number of persons was119 thousand in 1997 but one year later was already 275 thousand.
The information and communication technology is a world - wide trend nowadays in teaching, learning and working processes as well as in everyday life.

Ergonomic design of workplaces with VDU, an active and good posture, taking regular breaks, training in good computer use are components necessary to avoid problems with health. It is very important to increase the employees' awareness of risks we will have different work forms with display – work in offices and at home. This study involved students of the Faculty of Economics and Business Administration of Tallinn Technical University who assessed their own workstations. The participants in the study were 19 - 24 years old.

2. Education process of ergonomics

At Tallinn Technical University the ergonomics course is aimed at disseminating all contemporary knowledge concerning the use of using VDU through lectures and through taking practical measures to improve work environment:

- visual ergonomics: lighting conditions at workstation and luminance ratios in the line of sight and on software
- postural ergonomics: suitability of the chair and desk, keyboard and mouse, the height of the display screen
- noise level around the computer and also the workroom,
- electromagnetic radiation around the computer and mobile phone
- problem-solving abilities concerning Internet research using Copernic program from the aspect of ergonomics and work environment legislation.

3. Health problems associated with working with standard office VDU

According to scientific and epidemiological studies computer related injuries cover a wide variety of health problems caused or aggravated by computer usage. These can be broadly divided into subsequent groups:

- eye strain & discomfort as computer vision syndrome (CVS)
- work related upper limb disorders such as carpal tunnel syndrome (RSI)
- back problems
- mental tiredness

Estonian ordinance focuses of responsibilities directly to the employer to provide safe working environment for users

through risk analysis and to inform the users who work a significant part of the working day with VDU about measures that they should take to protect themselves injury. We compiled a questionnaire to clarify:

- possible ergonomic risks for users working with VDU at workstations
- number of hours the respondents work with VDU daily
- health problems of VDU users any when they work less than full time
- needed direct costs for improving work situation in offices as well as at home

4. Discussion and results

The received data on health complaints were compared with the relevant indicators for persons who use a VDU during up to four hours to full work time at offices. From 111 respondents 58 work at offices daily up to four hours, 53 five to eight or more hours daily and 38 students work up to four hours at home. Figure 1 compares the distribution of complaints between students who work daily up to four hours and more hours at offices. The spectrum of complaints is approximately the same but those who work more than four hours daily at offices suffered pain in legs.

Respondents who work up to four hours daily at home have mainly complaints of visual discomfort (Figure 2).

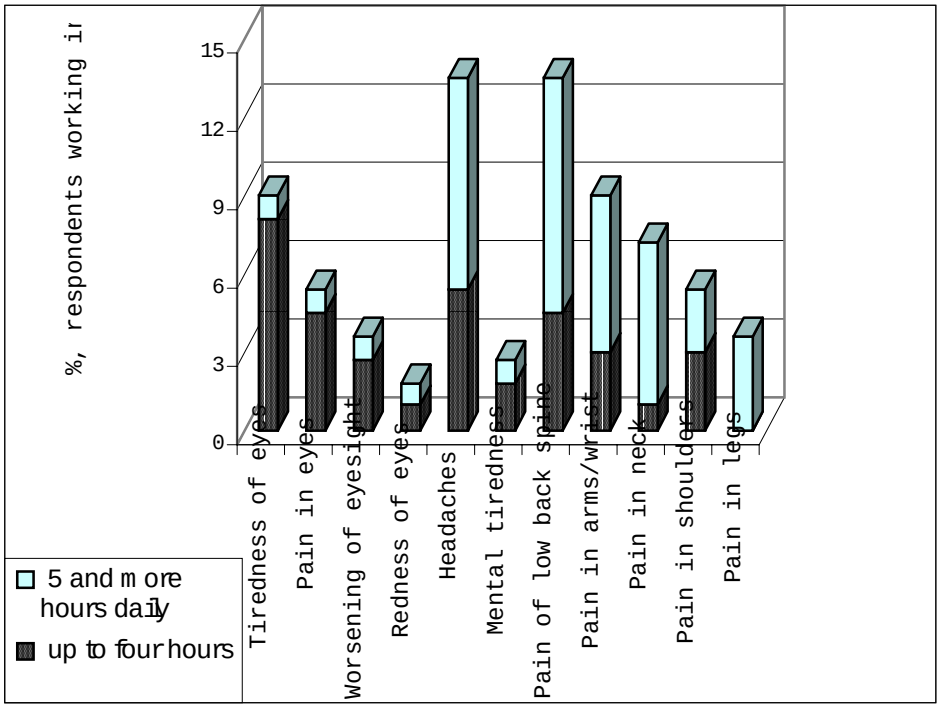


Figure 1. Distributions of complaints by VDU users working daily up to four hours and full time in offices.

On the other hand those who work in offices up to four hours daily complained of all possible discomforts. For respondents who work at home the basic visual discomfort was pain in eyes (18%) and headaches was reported by 12.1%. As to of physical discomfort, VDU users who work up to four hours daily in offices experienced eye tiredness (15.5%), eye redness (1.7%) and mental tiredness (3.4%). Others discomforts are approximately at the same level.

In some cases risk assessment showed up to eleven errors with respect to the visual and postural ergonomic situation at workstations with display at home and up to ten errors in office.

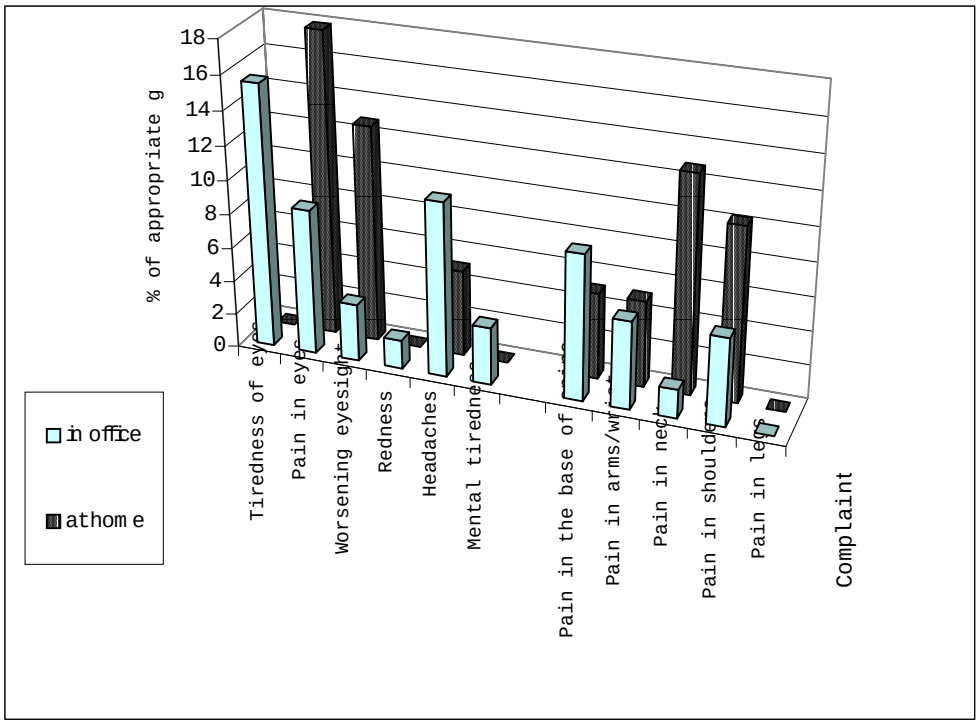


Figure 2. Comparison of discomfort in office and at home by respodents working daily up to four hours.

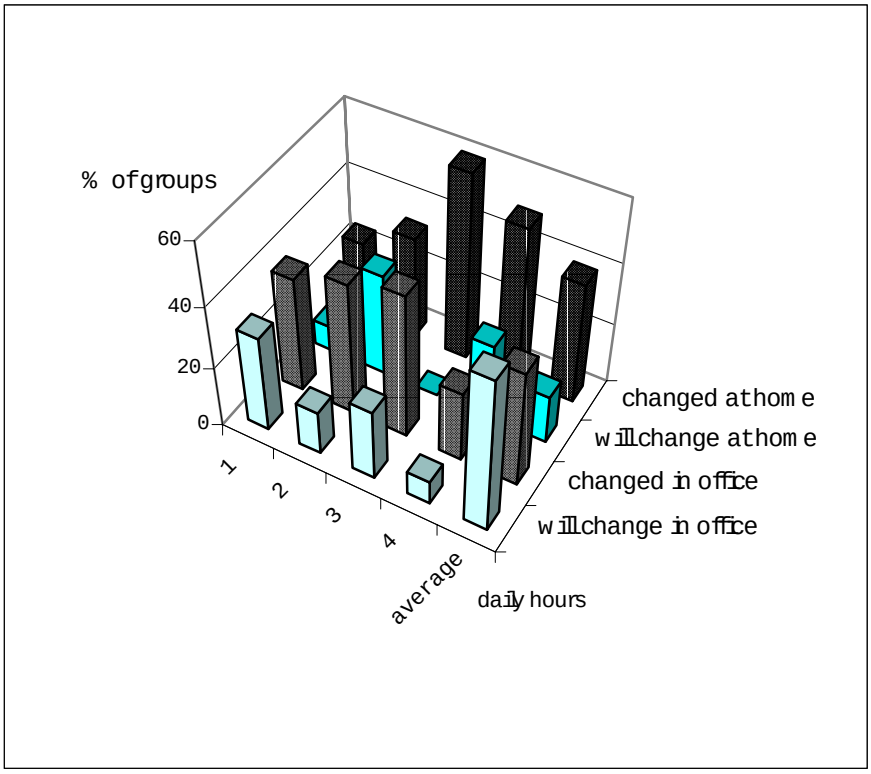


Figure 3. Improvements done and needed at workstations at home and in offices by respondents working up to four hours daily.

After the course the students improved their workplace without spend any money (38 % in offices and 40 % at home). It would be easier to solve visual problems by relocation of the workstation, moving the screen to reduce glare etc. Figure 3. However, suggestions were made involving direct costs for major changes in lighting system also for VDU glare screen (particularly at home).

Students found significant risks for themselves in postural ergonomics. At all - in offices needed improvements 88% of workstations and at home 55% needed improvements by respondents working up to four hours daily (Figure 3). To solve these problems direct costs are necessary, for example changes in hardware (mouse or new VDU). Suggestions were made involving direct costs for appliances such as a wrist support, chair, desk, footrest, even air conditioner were suggested.

To investigate the influence of the duration of working time with display on health all respondents were divided into three groups depending on the number of complaints (1, 2 or 3). Only in the office groups there were with three complaints (Figure 4). The number of complaints of persons who work up to four hours daily in offices made up approximately a half of the number of different complaints (see Figure 5) and the level was the same independent of whether respondents work in offices or at home.

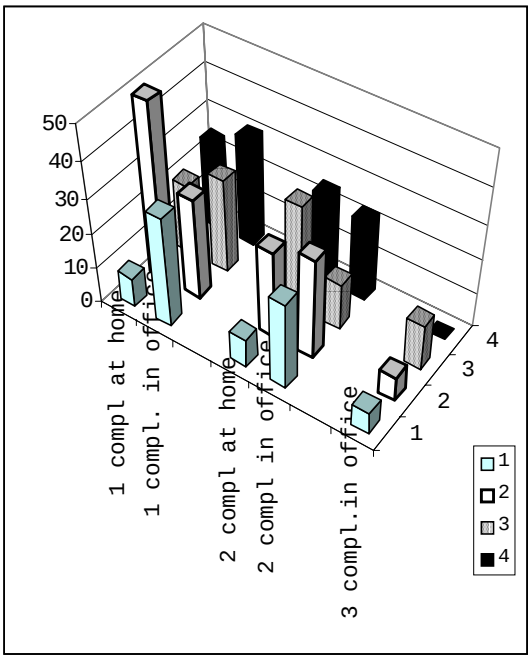
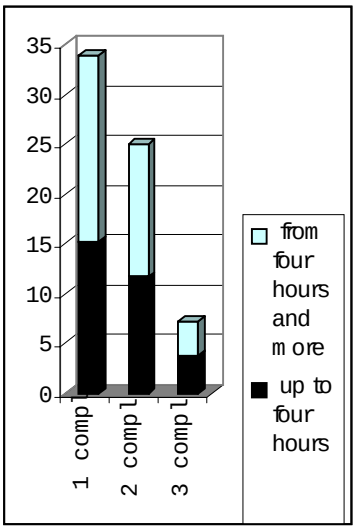


Figure 4. Distribution of complaints at home and in office working with VDU within four hours (1,2, 3, 4) daily

Figure 5 Distribution of complaints by



VDU users by number of complaints and daily work hours in offices

The results of the study show that improving of workplaces in offices requires more direct costs than at home and that in the first place visual discomfort should be handled. Students experienced that their ergonomics course was just in time to avoid impairments of health in the future.

From the aspect of legislation it is necessary to review Estonian ordinance and the present unclear phrase “a significant part of the working day” will have to be changed.