Multimedia supported study of achieving high worker's efficiency in relation to his work

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Electronics, engineering and medicine expert collaboration as rule requires knowledge of both the remaining fields from each of experts to result in a useful application. Ergonomics and work process management are the goals achieved by such approach. Comprehensive analysis of work process, influenced by environmental factors and output, measured as a function of these influences, is a cornerstone of these multimedia CD compilation, presented both in a textbook and handbook format. In the electronic publication study contents are combined with practical experience of efficient Slovenian companies, which were prepare to present a piece of their experience.

1 Introduction

The interactive electronic publication MAN-WORK-EFFICIENCY is prepared in a form of CD containing pedagogical and related scientific and research elements of analysis and synthesis of working systems. By a contemporary access – that is enabled by today's information technology – we tried to additionally motivate an independent and individual study, opened in the way of discussion and research. On the whole, this CD is divided in two parts (theoretical and practical one), which are dynamically linked and interwoven. Certain corresponding points in the contents provide the link between both parts, where theoretical part is linked to the practical one and inversely.

Today, all the disciplines are increasingly interconnected, and, in this sense they are exploring new and interesting ways that usually lead towards the entirely new dimensions of thinking.

Interdisciplinary themes can't withstand not to imitate and apply the complicated system into a related one, which is mathematically and algorithmically easier to be managed. In this process we are essentially helped by an up-to-date information technology that stimulates procedures which would otherwise demand much more painful work. Among single disciplines there is an intertwined net of information and because mastering of single specialty is subject to the inner field of profession, there was, for example, in the field of interaction between a man and a machine, established a science called ergonomics. This field is very important for in any human activity we are aiming to attain the optimal results by taking into consideration all human principles of human work [1]. The study of this scientific discipline is interdisciplinary one since at each step we are reaching for in the field of ergology, medicine, biomechanics, anthropology, physiology, psychology, sociology, environmental studies, work organization, system theory, technology, techniques and industrial design [2]. We can say in regards to performance qualities, human and computers complement each other, rather than compete. Our expectations of what information technology can do, should therefore be based on human and machine complementarily, and directed towards an active support to mental processes [3]. Taking in consideration such an extensive and ramified subject it was clear that some parts of the scientific literature had to be united on an integral basis of knowledge. In this process we could be helped by a multimedia access.

2 Working methods

Electronic publication was produced in the Microsoft Windows 98 environment by means of Microsoft PowerPoint 97 tool. The content can be viewed and interactively communicated with by support of Microsoft PowerPoint Viewer 97 application.

In preparing CD we kept to didactic and pedagogical principles. Electronic publication was first of all conceived as a manual with theoretical and educational contents meant for everyone who is dealing with analysis of working processes, from work organizers, safety engineers, to medical doctors specialized in medicine of work. Besides the above mentioned the CD is also a manual providing instructions for introduction into research projects in the field of designing healthy working environments. It contains a series of practical examples from companies where working processes are already ergonomically designed and serve us as help, respectively, as a model. And indeed, this perspective gives us a superstructure of the acquired knowledge and represents applied solutions from different fields of elaborated topics.

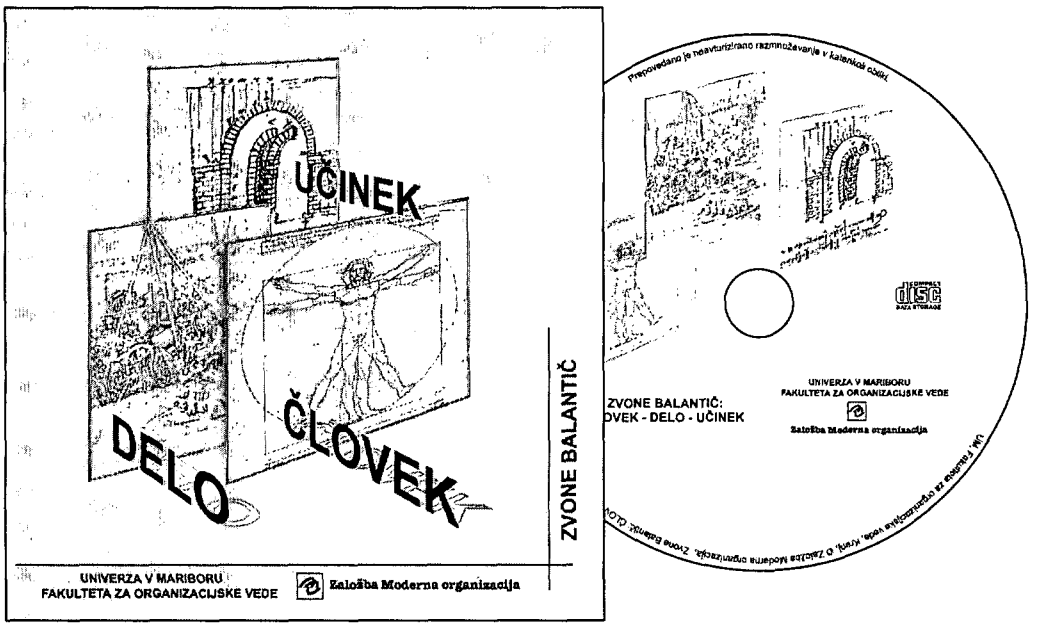

Figure 1: Electronic publication MAN-WORK-EFFICIENCY

The electronic publication MAN-WORK-EFFICIENCY could be used in the pedagogical process (in doing exercises – contents' comprehension; working in laboratory – solutions that are suitable for applications), in designing the working process at a workplace, in research projects (methods of measuring...), in encyclopedic refreshment of single topics (chapters' structure) etc. A "rounded book" is meant for students and professors in the field of organizing working processes, meanwhile in the field of direct application, to the top employees of the company and related production units, safety engineers, system theorists, consultants, design engineers, technologists...

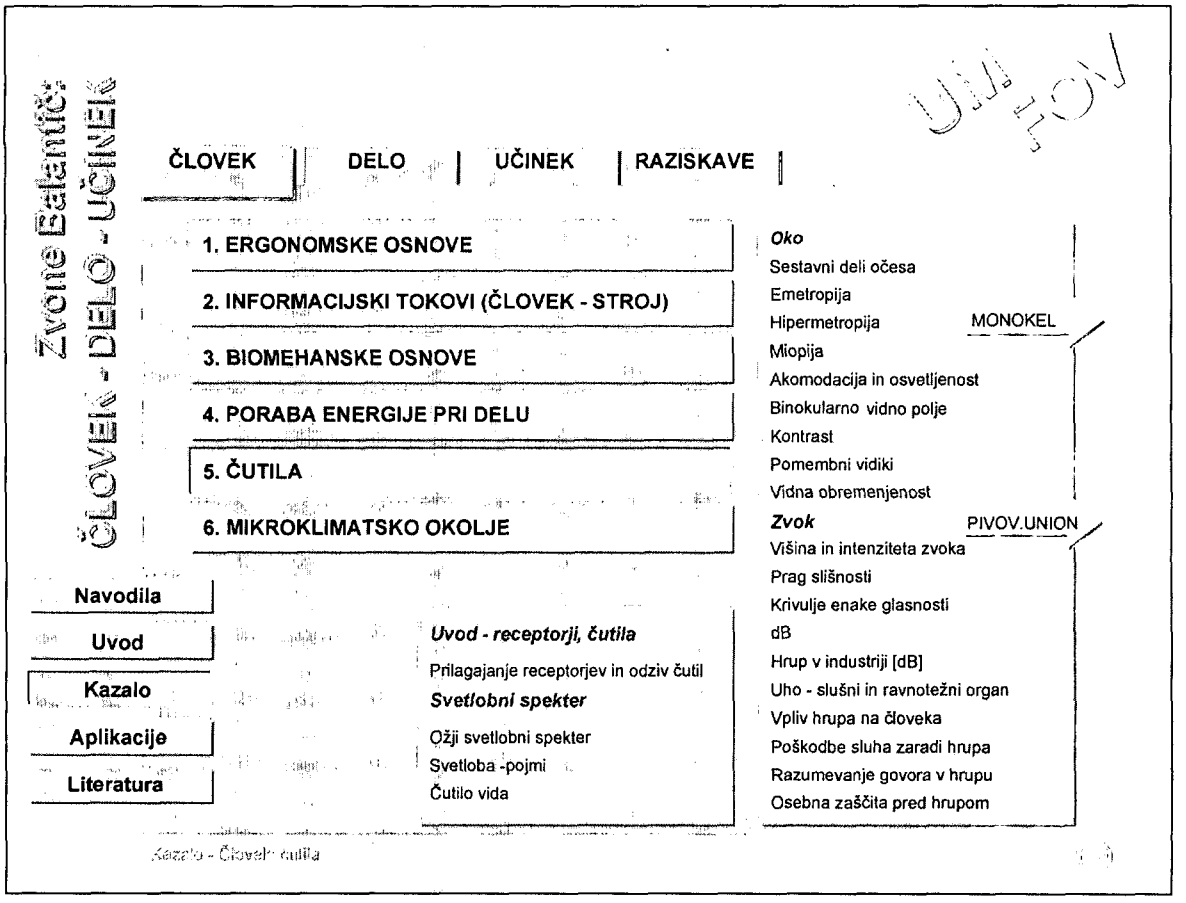

Figure 2: Communication window of the index

By using software package PowerPoint 97 we exploit all available possibilities of the multimedia presentation incorporated this package. The segments are represented in the interactive way and are dynamically interconnected. The represented topics contain scientific & research elements of the analysis and synthesis of the working systems based on theoretical comprehension and practical experiences. The guidance is carried out from introductory database and is in accordance with a logical completion of knowledge.

By inclusion of multimedia elements the presentation tries to be interesting and an up-to-date one. Already at the start we are acquainted with 17 theoretical thematic complexes that comprehend the areas of work's designing, ergonomic basis, information flow between man and machine, biomechanics in relation to a man, energy consumption at work, senses for sound and light, designing of working environment with charges and efforts, computer work, temperature of the environment, scheduling of the working time, production and technical basis of work, phases designing of work, safety at work... The communication window calls our attention also on 20 applications, which are directly linked to the theoretical topics, yet they derive from practical examples generated in Slovenian companies. In this part the following topics are presented: designing of workplace for a disabled worker, problems dealing with attaining the threshold of pain, solving the noise in the working environment, correct sitting in working with a computer and simultaneous communications and feed-backs in regulatory circles... [4].

Finishing the CD we can resume that we went through 710 pages supported by multimedia. We walked through 260 figures, 353 author's drafts and 233 graphs. Theoretical and practical part differs in colors and partly in design. Each individual can regulate the rhythm of study by himself in returning from certain theme and skipping along different generally established ways (stepping forwards/ backwards, skipping at the beginning/ at the end, from one topic to the other, from the theoretical to the practical part, using the hyperlink with the internet...).

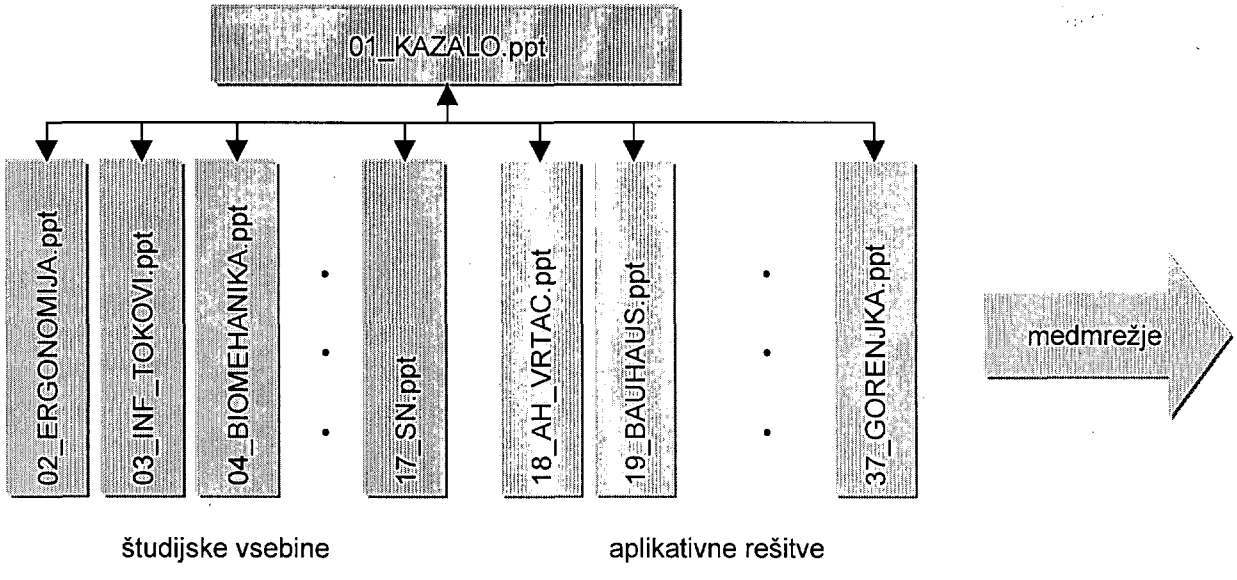

Figure 3: Thematic construction of the electronic publication MAN-WORK-EFFICIENCY

The communication with the electronic publication stimulates the quality of the study (individual study and topic related discussions), encourages the innovative activity in the field of the man in the working process and broadens the awareness about the importance of the presented knowledge. If we think about the study as of a working process, then planning, preparation, execution, control and management are taking place in it. The use of the multimedia CD takes place in the closed regulatory noose, where by means of the comparative article we can establish the deviation from the reference values and, in this way, we are able, in each moment, to correct it.

3 Discussion

In its concept, the electronic publication is devised as a system of hierarchical study. For the reasons of present ability and constant overview of the contents, it is always recommendable to set a basic point of orientation. The index is the most suitable starting point from which we are looking for the new ways and try to orientate ourselves in the system of a multi-layer study material. The system of absorbing oneself into the knowledge follows certain explanation, which means going deeper and deeper, finally to the level of details. Since in the CD MAN-WORK-EFFICIENCY we find theoretical and practical contents, we would like to emphasize, that the links between both branches are not

established at the deepest level – where by using "hyperlink" we would search for the parallels in the details – but are set at the upper level (index), where we are returning after we have been acquainted with the theoretical part. Our choice can be also the opposite one, i.e. to go through the layers to the theoretical details after being acquainted with the practical contents.

Multimedia simulation supports virtual walk through the contents, which are sometimes difficult to explain in a classical way. Studying, we go through information net, composed of graphs, tables, explanations and animations.

A set of information follows in a logical turns and, in this way, forms the so-called table figure, which is similar to a real figure from a lecture. The whole complex enables an autonomous study, which is later linked to discussions at different levels. Thus, a possibility is given to design "a study on a stock", with the students coming to attend the lectures but having already a certain knowledge that serves for a discussion on a certain topic. In this way we stimulate the process of thinking and wake up creativity, which is based on a stocked knowledge, and temporary situation points that are modeling the information mass in a new form. In creating new ideas a decisive role is played by knowledge, experiences, mental ability and capability of constructive thinking. The challenge lies in the theoretical part of the electronic publication, meanwhile in the practical–applicable part the constructional characteristics of the devices, work planning, study of documents and analysis and synthesis of the processes are exposed. By a mental activity, besides a direct action, an information process–as a part of the activity between man and environment–takes part. Within the framework of the considerations about the electronic publication we can see the meaning in encouraging perception, interpretation and processing of the information that we got through our senses. By an absorbed work with the multimedia educational tools we try to remain inside our abilities of information' reception (34 – 42 BIT/s). Namely, in everyday life, the capacity of the central brain system can't manage to process the whole incoming information' flux. The truth is, that the capacity of the human long-term memory is inconceivably large and according to some estimation it lies between 10^8 and 10^{15} BIT. But there is also presented the problem of the information channels translation, which is the highest at the perception (10^9 BIT/s) and the lowest by creating a lasting impression (0,7 BIT/s) [5]. It's obvious that always occurs a reduction of the process, and that's something that all the creators of such electronic publications should keep in mind.

4 Conclusion

The primary orientation towards health should be – besides calling attention to bad habits – encouraged as well by a professional access aiming to eliminate the risk factors that cause diseases at workplace. At this point, the interdisciplinary overgrows all the interest fields and, by team operation of different professions, it raises a hope for a success in the area of the primary prevention either. Even the physicians qualified to participate in organizing a working process (specialists for the medicine of work) can find, in such collaboration, a new motivation for their work. Besides the study contents this electronic publication contains all the elements of the manual for a real help in designing working environments that are less harmful to the human health.

5 References

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