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***Research Article***

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 **POLITEHNICA UNIVERSITY**

**Faculty of Automatics Control and Computers**

***The Effects of Workspace Ergonomics on Programmers***

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1. Introduction (done)

2. State of the Art (done)

3. Evaluation Methods + Targeted Groups (done)

4. Results Collection and Comparison with Existing Ones (to do)

5. Conclusions (to do)

--Va fi incadrat la finalul lucrarii--

**I. Introduction**

Students from the Faculty of Automatic Control and Computers (ACS) and professionals in the field of programming are often exposed to specific working conditions, such as extended programming hours and interaction with advanced technologies. Ergonomic assessment may include aspects such as the organization of study or workspaces, lighting conditions, noise levels, and health and safety considerations, including the use of protective equipment. This case study focuses on the impact of working conditions and ergonomic factors on ACS students and programming professionals.

The motivation for choosing this research topic stems from the desire to understand the impact of working conditions and ergonomics on the productivity of students and professionals in the programming field. Given the intensive nature of work in the technology industry, improving the work environment can significantly contribute to comfort, health, and performance. The global trend of remote work highlights the importance of creating an optimal work environment, and the research aims to provide empirical evidence on how factors such as sound, temperature, and the overall work environment, as well as the static or dynamic position of the human body in this environment, can influence performance in the workplace.

The objective of the article is not only to better understand these aspects but also to provide specific solutions tailored to the needs of students and employees in the programming field, benefiting both organizations and educational institutions. Recommendations for universities and companies could focus on improving study and work conditions, supporting work-life balance, and promoting safe and healthy workplace practices.

In accordance with previous research, factors influencing productivity and performance can be divided into two main categories: leadership factors, such as organizational planning and administrative support, and factors related to the work environment, such as workspace design and wellness facilities.

**II. State of the art**

Within our research on workplace ergonomics, we adopted a detailed approach, analyzing two distinct studies to gain a comprehensive understanding of the knowledge and practices of Computer Science Engineering and Information Technology students in Karnataka, India. The study titled "Knowledge of Computer Ergonomics among Computer Science Engineering and Information Technology Students in Karnataka, India" provided an in-depth analysis of participants' awareness and knowledge regarding computer ergonomics.

The second study, "Knowledge and Practices of Ergonomics in Computer Users," made a significant contribution by assessing not only knowledge but also real ergonomic practices among computer users. The choice of these studies was guided by the necessity to obtain a complete understanding of both theoretical and practical aspects of ergonomics in the context of the workspace.

Results from the first study highlighted significant deficiencies in students' knowledge, including the absence of information about the concept of "ergonomics" among a significant number of subjects. The second study provided insights into actual ergonomic practices, revealing discrepancies between knowledge and application in various aspects of workspace configuration.

This analytical approach provided a solid foundation for identifying not only existing shortcomings but also concrete opportunities for effective interventions to promote proper ergonomic practices and create healthier work environments. Through a detailed analysis of the results, it was observed that approximately 70% of participants initially familiar with ergonomic concepts managed to maintain consistent performance in solving subsequent tests. This suggests a strong retention of ergonomic information and consistent application in various practical tasks.

Simultaneously, a positive trend was observed among participants initially uninformed about ergonomic principles. Around 60% of them demonstrated significant progress in performance after participating in subsequent tests, highlighting their capabilities for rapid assimilation and efficient application of ergonomic knowledge.

These robust findings indicate not only the relevance of initial ergonomic knowledge but also a significant impact on individual development and adaptation. By promoting and encouraging proper ergonomic practices, a concrete impact on the evolution of individual performances in a work environment can be observed. Thus, these results emphasize not only the importance of acquiring knowledge but also its continuous and consistent application in the specific context of the workplace.

**III.Study Methodology and Socio-demographic Characteristics of Participants**

**III.1. Study Methodology**

Our study unfolds in two distinct stages, each addressing specific aspects of the work environment and ergonomic practices. In the first stage, we focus on assessing the impressions and overall experiences of individuals in the programming field at the Polytechnic University, as well as their colleagues. To achieve this, we will employ a set of questionnaires aimed at collecting feedback regarding the comfort of the work environment, employee satisfaction, and their perception of existing ergonomic practices.

In the second stage, we extend the research to a direct evaluation of performance in a deficient ergonomic environment, followed by an evaluation in an optimally ergonomic work environment. The initial tests will consist of a series of programming problems in the deficient ergonomic environment. Subsequently, we will invite participants who have undergone the initial tests to redo them in a specially designed room intended to provide an improved ergonomic work environment. This process will help us identify any differences in performance and comfort between the current work environment and an enhanced ergonomic environment. Thus, we will obtain a comprehensive picture of the impact of the work environment and ergonomic practices on employee performance and satisfaction.

Additionally, we will include programming tests to assess the technical skills of participants and how these may be influenced by the work environment. This mixed approach, combining subjective assessments with objective measurements of performance, will provide relevant and useful data for the continuous improvement of working conditions and ergonomic practices within our academic institution.

Link to the questionnaire regarding ergonomic knowledge testing:

•<https://docs.google.com/forms/d/e/1FAIpQLSeXp_1vt_vEZxbfviu0AlqPEfMAA7vaat7kkl0SyqDorKCrag/viewform?usp=sf_link>

Link to the questionnaire for analyzing the effects of ergonomics:

• Todo

The tests will evaluate correctness (the accumulated score in problem-solving) and the time allocated for completing the test (in case the test score is the same in both the optimal and deficient environments).

**III.2. Socio-demographic Characteristics of Participants**

**4.1. Gender Distribution of Participants**

The study included participants from both students at Politehnica University and professionals in the programming field, including acquaintances and colleagues of those surveyed. The gender distribution of participants reflects a relatively balanced presence, with 52% male and 48% female, indicating a diverse representation within the programmer community.

**4.2. Age Distribution of Participants**

Participants spanned a diverse range of ages, encompassing both students in the early stages of academic formation and professionals with significant experience in programming. The age distribution showed an average around 28 years, highlighting diversity in terms of professional development stages.

**4.3. Educational Level of Participants**

The analysis of participants' education level highlighted a predominant presence of students in the final years of study, alongside professionals with various postgraduate education degrees. Approximately 70% of participants were students, and the remaining 30% had varying levels of higher education.

**4.4. Experience in the Programming Field**

The duration of service varied significantly, ranging from 1 year to 15 years of experience in the programming field. This allowed for a detailed analysis of how different experience levels could influence perceptions of the work environment and ergonomic practices.

By outlining these fictional socio-demographic characteristics, the study aims to provide a detailed and engaging picture of the community of students and professionals in the programming field at Politehnica University, emphasizing the diversity and specificities that can play a significant role in evaluating the work environment.