

The application of cognitive ergonomics in the management of various educational topics

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Abstract: In the present paper there is a description of the manner that various educational management processes are implemented, using the Greek secondary education system as an example. These processes are described in comparison with the goals of cognitive ergonomics, revealing their disadvantages. Alternative ways of implementation are proposed for increasing the efficiency, the security, the correctness and the easiness of the working conditions through a better usage of ICT but also through the application of relevant practices of other organizations.

Keywords: cognitive ergonomics, educational management

INTRODUCTION

The public secondary education accomplishes to main tasks: the educational activity (teaching and learning) and the managerial support of the former, which is the prime task of a school as an organization. The latter task, regarding schools, can be classified into two separate activities: the inner secretarial support and the outer communicational processes with the superior echelons of educational management. All these activities are conducted according to certain practices and relevant regulations that are not necessarily effective or efficient, regarding the existent conditions. For the improvement of these practices, cognitive ergonomics may contribute useful guidelines along with the usage of ICT.

Cognitive Ergonomics

According to Cañas *et al.* [1]:

“Cognitive Ergonomics is a discipline of ergonomics that studies the cognitive processes at work with an emphasis on an understanding of the situation and on supporting reliable effective and satisfactory performance. This approach addresses problems such as attention distribution, decision making, formation of learning skills, usability of human-computer systems, cognitive aspects of mental load, stress and human error at work”.

Regarding the contribution of cognitive ergonomics to the previous educational activities, the generally accepted goals can be applied as well [2-5]:

- to enforce the safe execution of a task;

- to reduce the percentage of errors;
- to increase productivity and effectiveness;
- to ensure comfortable conditions that satisfy the users of a system.

According to the above goals, the manner of the daily functionality of the afore-mentioned educational activities was examined in the schools of the Greek secondary education as a case study, namely considering the topics of teaching practice, secretarial support and communications that are conducted by this entire system. For every activity, various problems were detected while possible solutions are proposed regarding the improvement of those practices and the required changes in the organizational environment, in order to make these activities more conforming to the goals of cognitive ergonomics.

Teaching practice

According to a relevant report [6], a subjective difference of at least 20% in the performance of teaching adequately the same material has been observed from session to session, in consecutive lectures of the same day. The general conclusion was that the performance was gradually decreased because of the accumulated cognitive fatigue, during the day.

To improve the quality of the teaching process, thus ensuring the goals of cognitive ergonomics (i-iv), a shift to problem/project-based learning is of course desirable. Nevertheless, such a shift depends on the general policy that regulates an educational system. When these conditions are not possible and the teaching

process has to remain in the classical lecturing, then ICT may provide a reasonable solution. The relevant devices include a standard television, a projector-PC set or an interactive board. The screening of a lecture via a film may reduce the daily cognitive fatigue of a teacher. The quality of the lecture is always of the same high standards, regardless of the screening time. In addition, it can be more interesting for the average student.

The department of Educational Television of the Hellenic Ministry of Education, Research and Religious Affairs [7] offers excellent films about various topics in addition to the production of educational CD's and other online digital material by the educational research institutes and agencies [8]. Yet, the introduction of ICT in the daily teaching practice is still slow and costly, both in terms of the required infrastructure and in the mentality of using it, although the necessity of it is generally recognized. The available material is rather limited compared to the curriculum and still of exemplary nature instead of a standard practice. Nevertheless, introducing of film-lecturing in the daily teaching practice, apart from reducing the cognitive-fatigue of the teacher, would also allow him/her to focus on more important learning issues, like the analysis of the screened events.

Secretarial support

One of the main activities of the secretarial support in education regards the recording of marks. In this respect, particular studies stress the importance of the simplicity of scaling along with the followed methodology [9]. For example once again, the 20-scale marking is utilized in the Greek secondary education. Apart from being unnecessarily detailed, the total mark of this scale is computed through the *average* mathematical coefficient, which is suitable for grouping the values of similar entities. Yet, within the entire class curriculum, History and Mathematics are neither similar nor comparable. A more precise coefficient would be the *median*, although not as easy to compute. A less error prone and more accurate method, in overall, is the simple sum of the separate mark per course in a single total.

Concerning this activity, the contribution of ICT is also crucial, provided that the effort will not be doubled by recording data both digitally and scripted. This double practice is often attributed to increased security reasons but it is a rather stupid remnant of the transition phase from scripted to digital recording, when both modes were kept in parallel. Additionally, in some public administration domains and mentalities, the script is regarded as more valid than the digital data. Yet, the required cross-checking between the scripted and the digital records over-doubles the necessary workload, wherever this outdated practice remains.

Communications

Correspondence is a crucial administrative activity of any organization, be it public or private. The usage of electronic mailing has become a standard practice over the last decade (in Greece). Yet, the relevant process has not been adapted to reasonable standards. A school is the executive unit of the educational administration, namely the last node (*leaf*) in the structure of the hierarchical pyramid (*tree*). Over there, above the school, there are two-three regional coordinative echelons before we reach the Ministry, on top. Because of the easiness of electronic mailing, a certain document from a Ministry's bureau, concerning some school activities, may arrive to a school's e-mail inbox up to four times from each one of the superior echelons [10]. Considering that the school's administration may receive a few dozens e-mails daily, the reader can appreciate the useless workload of the secretariat that often creates an administrative chaos.

The public educational communications system can adopt better practices from other public agencies, like the military communications for example [11]. In the latter system, a document is classified in three types concerning the mode of transmission:

- *incoming* to its final receiver;
- *outgoing* from its initial sender;
- *transit* when passing through from the coordinative echelons to its receiver.

In a hierarchical organization, a document can be transmitted from a superior echelon only to its immediate subordinate ones, whether it is *incoming* to them or *transit*, strictly by the authorized operators of the protocol office. Thus, the transmission of the document follows the chain of command [12] until its final destination, where it arrives only once. The advantages are obvious for reducing the useless workload.

CONCLUSION

The overall manner of the administrative and teaching practices of the daily educational activities can be occasionally very inefficient, as it was demonstrated with the case study of the Greek secondary education's system. The simple application of ICT can improve the teaching/learning process, the secretarial support and the communications of a school, by reducing the respective workload. Yet, this application is not sufficient enough without a previous adaptation.

The discipline of cognitive ergonomics provides four goals that lead to criteria and guidelines for the improvement of the teaching and managerial practices for a public educational organization, as it was

exemplified through the presentation of relevant topics in the Greek secondary education's system.

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