

Cognitive Ergonomics Aspect Benefit In The Learning Process

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Abstract. Cognitive ergonomics is an application which presses on cognitive factors mainly related to the process of thinking. While education is a learning process that can produce changes in behavior that is expected. For it is necessary to study the benefits of cognitive ergonomics in the learning process, especially in designing the learning model. In this research method used was a literature study that seeks to be studied in depth and presented in a narrative based on the facts disclosed by cognitive ergonomics experts and experts in education. The purpose of this study was to determine the benefits of cognitive aspects of the learning process. From the results of the study carried out can be presented as follows: (1) aspects of cognitive ergonomics is very dominant in designing the learning model which is oriented to the principles of ergonomics that emphasizes the aspects of user friendly,(2) how to implement aspects of ergonomics in the design of the model learning is part of cognitive ergonomics because it involves thinking and mental processes in designing the model, and (3) the constraints faced in the implementation of aspects of cognitive ergonomics in designing learning model would seem to be a serious problem if not addressed as soon as possible on an ongoing basis and through a participatory approach and examined holistically. Suggestions can be submitted are: (1) in designing a model of learning should be tapped / pay attention to aspects of cognitive ergonomics early, so it can produce forms of learning model ergonomic, (2) the results of this study can be used as a reference in tracing rules of ergonomics in designing the learning model.

Keywords: cognitive ergonomics, design, learning model

I. INTRODUCTION

Cognitive ergonomics is an application of ergonomics that put more emphasis on cognitive factors mainly related to the process of thinking. Education is a learning process that can produce changes in behavior that are expected. Application of cognitive ergonomics will work to improve our understanding of human relations, communications systems and complex machines [1]. According to Bloom's taxonomy of educational outcomes can be divided into three domains, namely: (1) cognitive, (2) affective and (3) psychomotor. Especially with regard to cognitive abilities can be divided into six capabilities: (1) determine the ability to remember what they have learned, (2) understand that the ability to grasp the meaning of what is learned, (3) applying the ability to use what you've learned into new situation concrete, (4) analyse is the capability to specify the things they've learned into its elements in order of receipt organization is understandable, (5) to synthesize the ability to collect the parts to form a new unity and (6) evaluate the ability to determine the value of something that is studied for a particular purpose [2]

The ability of someone typically as something that is effective, efficient and able to satisfy the user and can achieve the results was identified in the special environment [3]. This expression is used as a cue to determine the limits of cognitive ergonomics and the factors that influence and have an impact on student learning. Utilization of cognitive ergonomics said as a way of actual or up to date and very attractive interest students in using learning resources [3]. If examined some of the

statements above seem indeed need to explore the benefits of cognitive ergonomics in the learning process. In addition, the implementation of aspects of cognitive ergonomics will certainly make learners feel more comfortable in accepting what you want to be delivered in the learning process in the form of learning methods as well as various media broadcast via audio-visual (e.g., a computer). In the method of learning, cognitive ergonomics can be studied is the thought process in determining learning tips that should be set out in a model of learning.

Everything was of course closely related to the mental processes of the designers should start from the planning already think about aspects of any proper ergonomics incorporated in the model lesson. While in the media, for example in the use of computers as one of the media which is heavily influenced by the program contained therein. The program is exactly what needs to be assessed based on the study of cognitive ergonomics so that learners can use it optimally without causing negative effects on health or in other words the media is safe, convenient, effective and efficient.

Based on the background, it can be delivered the formulation of the problem that is why aspects cognitive ergonomics is very helpful in designing the learning model and how the application of cognitive aspects of ergonomics in the design of learning models.

The aim of this study is to investigate the cognitive aspects of ergonomics that can be utilized in designing the learning model and to examine ways of implementing aspects of cognitive ergonomics in designing the learning

model. While the benefits expected from the results of this study is that it can be used as a reference in reviewing aspects of cognitive ergonomics, especially related to the design of a model of learning, and can be used as input for the designer models and instructional media should early on have applied aspects of ergonomics.

II. RESEARCH METHODOLOGY

The material in this study is in the form of the opinions of experts who revealed, reported the results of research and study the cognitive aspects of ergonomics mainly be attributed to the learning process.

The method used was a review of literature or studies literature which seeks to study in depth and presented in a narrative based on the facts disclosed by cognitive ergonomics experts and experts in education.

III. RESULT AND DISCUSSION

A. *The use of PDAs (Personal Digital Assistant) in the learning process.*

Reports that research centers on graduate students were using the learning model in the form of a course application of information technology to the class model by far and the process is: (1) submit online, (2) using web resources and (3) Conference in the first class. Here, students can choose to read on a PDA (Personal Digital Assistant), or only on molds or both [3].

Students in the course of learning by sharing a special time and involved in other professional activities. They are generally in their 40s and come from different cultural backgrounds so that the courses delivered globally. The course seeks intensified the students to criticize and evaluate their own experiences in using information technology. 65 students enrolled in the course are given Palm M150 PDAs in July 2001. Most state PDAs as a novelty, although some students are already using palmtop computers and several students individually using a PDA or a similar tool.

It was also reported that the PDA has advantages and constraints [3]. In addition, the device is said to be able to influence student reading strategies. In the context of learning, readers often make a note in the text itself such as words underlined, written in the margins and others or around a sheet of paper, with the statement and note that there is included in the investigation.

Palm M150 has been selected for cheap and affordable and popular models. Also, has a touch-sensitive screen and stylus pen is used to interact with the application. Text can be entered via the keyboard is on the screen or introduce a system of handwriting Graffiti. WordSmith, a document editor or viewer used to present course material in the PDA. The mode in the document viewer enables users to read and look at the text in the entire place. Judging from the

aspect of cognitive ergonomics found in the model that raises the question of "whether the notes in a different mold from those on the screen?". It was said to be a challenge. In addition, the PDA can be checked back in the desired information and also can be known other components such as battery living, memory on a PC, laptop or other interventions [3].

Especially on the ergonomic aspects in the PDA as a medium of learning, needs to be observed regarding: (1) the text is available on the PDA, (2) the tendency to use a color display with a good quality, (3) the appearance of the backlight, and (4) the possibility to be combined with other tools such as a phone that can be transferred move. The advantage of this medium are: (1) the learners naturally be looking for fun (eg: games, fun accessories), (2) no sign or signs of danger of overwriting and (3) no personal contact information to the mistake by the user.

Some ergonomic problems are successfully evaluated, namely: (1) difficult to read because the text is too small and narrow screen, (2) if the font widened messier text, scan(3) eye pain, and vision problems when viewing the screen and choose the instruction manual for printed are designed to be read on the screen, (4) tends to exist rays of the information on the PDA, and (5) the noise when clicking or when selecting a function. That means the aspects of cognitive ergonomics is needed in designing a program to be both users friendly or oriented to the user [3].

Looking at the various benefits and problems that exist in the media PDA seems to be studied in further on aspects of cognitive ergonomics implied in the program so that later can be used as a medium of learning ergonomics. This is an answer to the question about the need for cognitive aspects of ergonomics in the design of learning models for the view and assess the advantages and problems that exist in learning media will be able to take an action by entering the principles of ergonomics into the program or the design with the expectation that the results will be able to meet the user desires related to safety, comfort, health, efficiency and effectiveness of its work.

B. *Cognitive ergonomics in designing the learning model*

Designing learning model requires reflection and careful thought. Design model of learning effective and efficient course will make learners feel motivated to learn something. The thought process in determining the tips that will be used in a model of cognitive ergonomics is an aspect that needs serious attention. The opinion was supported by [4] which states that a designer should be able to anticipate problems in an activity that is done in a system where efforts to prevent the negative impacts have been considered early on in stages. Insights a designer will determine the results of its work, where for solving various problems in the design of their expected: (1) can determine

ways of solving the partially based on his understanding of the results and the specifications of the design and (2) can evaluate these solutions with different criteria and constraints thereof. Observing that opinion must be understood that the thinking process in making a design study model will be strongly influenced by their experiences and insights. Here indispensable holistic way of thinking and how to assess the careful so that the learning model that made already considered interdisciplinary and scrutiny from various different viewpoints. If it could be done then learning the model, which refers to the principles of ergonomics must be manifested.

An example of the role of cognitive ergonomics in the recording of an object using a video [5]. Here is explained about the benefits of the rules of ergonomics in the design of the way the recording. Stated that the use of video in an observation is very necessary but not easy to do if you want optimal results. There are several problems that must be solved before recording. Here the required cameras are effective and in the process of recording, no information is lost. For the combined camera designed to be selected in the corner where the camera should be placed so that the recorded object can be controlled as desired. Illumination screens also need to be considered and, if using a camera clearly inadequate illumination on the screen as well as on the other side there will be a lot of loss of information. This example will remind us of the ways of designing a model of learning which results in information that is communicative, effective and efficient and does not pose a constraint on the user.

C. Aspects of Cognitive Ergonomics in Design Model Learning

Cognitive aspects of ergonomics need to be observed and traced through various research and findings of the experts, because of these references can be utilized in designing the learning model. Explained [6] that the application of cognitive ergonomics simply through some examples: (1) control interface on the VCR remote control (placement, orientation, size, model, and color), (2) design navigation computer (number, arrangements, how to access, and his appearance on the screen), (3) the design and layout of knobs and dial from the car radio, (4) the design and interface of medical devices and (5) the design and warning labels on consumer products (eg. color, configuration, size and placement). More complex example is: (1) the design and layout (configuration of equipment, furniture, etc.) from a hospital operating room in order to maximize the team's performance and minimize errors in perception, attention and judgment, (2) the design of aircraft cockpit commercial jet for correspondence with the crew in perception, memory and decision-making, (3) design an office to minimize distractions (confusion) and maximize productivity and performance, (4) the design of

the classroom to maximize the transfer of information, knowledge, and creativity, and (5) the design of web interactive page.

Based on the above example means that there are some rules of ergonomics required in designing a model. Here the learning model that is packaged in a medium of learning should refer to aspects of ergonomics and the designer should include elements of ergonomics since the media began to be made. Referring to the aspect of cognitive psychology, expressed as a science that emphasizes the human sense perception, reasoning, communication, action or actions and others [7]. Also stated that in physiology, information is synthesized in the form of perception (seeing, hearing, etc.), attention, memory, and reasoning. Cognitive psychology uses a process model in an information based on what is seen, felt and touched [8] and [9]. Some examples of media design of a learning model that requires the application of ergonomic aspects are as follows.

1. Design letters in plastic transparency
2. Color letters and background are shown on the screen.
3. How to display various information on the media that is programmed in the audiovisual.
4. Design the placement of the screen (height, distance to the learners, colors, and others)
5. Design lighting of the room (brightness, contrast, glare, how placements and selecting the type of illumination).
6. design scheme of a concept map or mind map.
7. how to make a summary of an effective and efficient.
8. way to show pictures on teaching materials, LCD, and Charta.

The above example can be used as an illustration in designing classroom or lecture hall associated with learning models to be applied as well as the media to be used. All this requires a process to think and reflect and review process which matures as a process of cognitive ergonomics in the design of media from a model of learning in the hope that the learning process can take place effectively and efficiently so that the learning can be improved.

D. Obstacles encountered in the implementation of those

From the results of the study some literature that discusses the findings of the experts around the cognitive ergonomics associated with the design study model, encountered several problems that need solving holistically. These constraints are as follows.

1. The designers of learning models do not realize how the importance of incorporating aspects of ergonomics in the program or design is created.
2. If the designers already know and understand the aspects of ergonomics, but because of the cost factor, the willingness of users, willingness of funders and dominance artistic frequently mess up the design of the program will be made.

3. the negative impact caused by the program design is not ergonomic frequent occurrence after prolonged use so that the awareness of the designer will be errors or mistakes done often too late.
4. the economic considerations sometimes more dominant than consideration of ergonomics.
5. Determination of the design study model is sometimes only be assessed based on one aspect only and should not be assessed in a holistic and interdisciplinary.
6. the design is made often only refers to the willingness of teachers so that the design will depend on the knowledge, insight, and personal of the teachers are sometimes very contrary to the rules that should be applied in a design.
7. Attitudes do not change and do not want to know the teachers often impede the realization of the implementation of aspects of ergonomics to create a design study model.

IV. CONCLUSIONS

A. Conclusions

Based on the above discussion can be made conclusions as follows.

1. Cognitive aspects of ergonomics are very dominant in designing the learning model which is oriented to the principles of ergonomics that emphasizes the aspects of user-friendly.
2. How the implementation of aspects of ergonomics in designing the learning model is part of cognitive ergonomics because it involves thinking and mental processes in designing the model.
3. Obstacles encountered in the implementation of aspects of cognitive ergonomics in designing learning model would seem to be a serious problem if not addressed as soon as possible on an ongoing basis and through participatory approaches and studied holistically.

B. Suggestion

That seems important to convey on this occasion is as follows.

1. it is recommended that in designing a model of learning should be considering the aspects of cognitive ergonomics so that the application of the rules of ergonomics can be included early on and realized in the form of a model ergonomics.
2. the results of this study should be used as a reference in searching the rules of ergonomics in the design study model is a process of cognitive ergonomics.

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