

# Ergonomic awareness and its shaping

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**Abstract:** The article presents the problem of formation of ergonomic awareness in the group of academic teachers, students of the University of Technology and the University of Economic Science in Poznań. A survey has been carried out to verify the knowledge of basic terms from the area of ergonomics, as well as the term of awareness and its interpretation in the group of examined people. The problem of forming ergonomic awareness has been discussed in different age groups. Methods of forming ergonomic awareness and methods adjusted to different age groups mentioned before have been presented. Both general social activities for shaping ergonomic awareness in the entire society and individual activities, directed on specific individuals, have been distinguished.

**Key words:** ergonomic awareness, principle terms, social groups, conclusions

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## 1. Introduction

The role of ergonomics and its aspects in man's life is very important. Its principles are used at present for designing workstations, but also in the private sphere—for designing and perfecting places of leisure, fun, but also in case of elements of home furnishings, devices and objects of everyday use (Olszewski, 2013). There are many examples: from places for work and play on the computer (chairs, desks, parts of computer devices, like for example a computer mouse), to devices for the household and things for everyday use (like pens, ergonomic cutlery, beds and mattresses and many other). Many people do not realize how often they use benefits of the ergonomics in their everyday life. Some of them perceive ergonomics as an aspect connected only with professional activities. Still, it is very important for their health to know and implement into practice principles of the ergonomics. A person with proper knowledge of this subject is able to understand that ergonomics and its rules help keeping a good health condition for longer. Therefore, it is so important to shape ergonomic awareness in the society. This refers

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not only to people who are occupationally active, who should know how to adjust their workstations for their own needs in accordance to principles of ergonomics. Ergonomic awareness is also important outside work because it can give many advantages for the man's health.

## 2. The purpose of the paper

This article is aimed at defining the term of 'ergonomic awareness' on the basis of already existing definitions of the ergonomics and awareness that the author has found in literature of the subject. Moreover, it is important to present the problem of ergonomic awareness to the group of participants of the survey. The paper also shows how to shape ergonomic awareness in the society.

## 3. Ergonomic awareness—definitions

The discussion on ergonomic awareness requires studying and understanding terms of ergonomics and awareness that can be found in vast literature.

The idea of ergonomics was used for the first time by Wojciech Jastrzębowski. He defined ergonomics as 'science on using forces and skills given to man by his Creator' (Jastrzębowski, 1857). According to the International Ergonomic Association, ergonomics 'studies relations between man and his occupation, devices and (material) environment in its wider meaning—including work, leisure, situations at home and during travelling' (Pacholski, 1986). In 1983 the Polish Ergonomic Association has formed a definition: 'Ergonomics is an applied science for optimizing the adjustment of devices, machines, technologies, organization and material work environment, as well as objects of everyday use, to requirements and needs of the physiologic, psychological and social demands of man' ([www.ergonomia-polska.com](http://www.ergonomia-polska.com), 2017). The definition suggests that ergonomics does not refer only to the work environment, but it is also used for objects of everyday use. It is important to remember that ergonomics is a discipline based on other sciences, like psychology of work, sociology of work, physiology of work, occupational health and safety, anthropometrics or social and technical sciences, like machine construction and engineering.

The definition of awareness can be found in dictionaries of the Polish language, but also in psychology dictionaries. It is basically a term that refers to human psychology. According to the PWN e-dictionary, awareness can be defined in a few different ways: as 'knowing about the existence of something', 'aims and targets common for all members of a certain group', 'state of consciousness' and 'man's ability to acquaint and assess himself and his environment, characteristic for a man' ([www.sjp.pwn.pl](http://www.sjp.pwn.pl), 2017).

- The Polish Language Dictionary edited by professor M. Szymczak defines awareness as:
- an ability to be conscious in categories of terms of what is the subject of registered perception and sensation,
  - the higher level of the psychological development that is characteristic for a man,
  - the mind's ability to reflect an objective reality conditioned by social forms of man's life and shaped in time of historical psychological development,
  - the threshold of awareness, lower limit of sensibility, under which external and internal stimulants do not deliver messages to the central nervous system (Szymczak, 1989).

This is a very developed definition that categorizes man's awareness as a part of his/ her psychics.

According to the online Multimedia Encyclopedia WIEM, awareness is:

- a physiological state of the central nervous system conditioned by a correct functioning of the cerebral cortex and the reticular formation that allows keeping the orientation on the place, time and situation (also called ‘the higher state of consciousness’)—definition used in medical science,
- a psychological term with many meanings:
  - a) skills to be aware of one's own behaviour,
  - b) the highest level of man's psychological development allowing reflection on reality,
  - c) a state of consciousness, waking, receiving stimuli,
  - d) ability to experience sensations and emotional states,
- a primal term in philosophy, whose meaning is being explained while using it, alike the primal terms of mathematics are being explained in the process of their application:
  - a) it means (approximately) consciousness, ability to focus the orientation and feelings, it constitutes the basis for creating knowledge and memorizing,
  - b) as self-awareness—it is a specific feature of the human species.

According to what has been established in phenomenology, awareness is always intentional and directed on a specific material or abstractive object and connected with the sensation of own ‘I’:

- in religions it is connected with the idea of the soul,
- modern researches on awareness involve different areas of knowledge, like: psychology, philosophy, biology (neuro-physiology), psychiatry and physics ([www.portalwiedzy.onet.pl](http://www.portalwiedzy.onet.pl), 2017).

Basing on existing definitions of ergonomics and awareness, it is possible to determine components of ergonomic awareness, like the knowledge about oneself in aspects of ergonomics, watching over fulfillment of the rule of ergonomics, perception based on the knowledge of perception of ergonomics and watchfulness—interpreted as due diligence, care for the ergonomic conditions of human life, resulting from understanding of significance of the issue. This leads to a conclusion that ergonomic awareness is a certain state of mind, of perception, based on a proper knowledge of ergonomics, which focuses on ensuring that conditions of external environment were adjusted to person's psychical and physical conditions.

#### 4. Formation of ergonomic awareness in different age groups

Shaping ergonomic awareness is related to one's education and accepting specific attitudes and believes based on the knowledge from the area of ergonomics. It is connected with preparing individual activities and behaviours in order to popularize them in social groups or entire societies, sharing ergonomic culture, consolidation of the belief about the existence of mutual connections between the level of the quality of life of individuals and societies (Domeracki, Tyburski, 2011). Education and formations are the most important for shaping the awareness; they determine educational programmes for different age groups: in primary

schools, high schools or universities; they significantly influence man's development from pedagogic point of view.

Man shapes his worldview and attitudes, believes and awareness on the basis of different sources of information, such as media, work environment, social environment, etc. Each group of age is susceptible to slightly different messages affecting the development of attitudes and beliefs on ergonomics. The knowledge on ergonomics is the crucial element in each of these groups. Only a certain level of knowledge can guarantee a proper formation of awareness from this area. In this case, education remains the main source of knowledge: both scholar or academic, and the knowledge gained from individual studies from books, magazines, TV programmes, etc.

Presenting certain values, views or attitudes to school pupils is an elementary method for shaping the awareness in this area. If the same values or attitudes are shown both by teachers and parents, there is a bigger chance that the influenced person will develop a required awareness. One must keep in mind that it is crucial to present the knowledge from the area of ergonomics that would be suitable for the age of the receiving person. In this case everything depends on how children will be directed by their teachers and parents.

A little older people, high school students, have already developed certain values, views and attitudes. In this case formation of ergonomic awareness would be the most efficient provided it functions basing on different sources: school education, external environment, the media.

The same methods work for adults. In this case scholar education is not so important anymore; it is mainly replaced by the influence of the external environment, and especially the work environment of the specific individual. Therefore, it is so important that employers are also aware of the fact that the environment they create affects in a way their staff attitudes and awareness. Therefore, it is crucial to promote ergonomic attitudes and knowledge in the work environment and to give information on material, economical and health benefits resulting from this awareness of the environment. It is fundamental to make employers aware that an employee with ergonomic awareness would bring him mere profits. Such employee has a better knowledge of safe work, he is more efficient and he generates less losses (like accidents at work or sick leaves). Therefore, the promotion of ergonomic awareness in the work environment is so important. In case of older people, with already shaped views and awareness, any changes of attitudes are very difficult. Older people often want to keep their beliefs, they think that what was acceptable until now, is the best solution and shouldn't change. Unfortunately, they do not want to hear about many new truths that came out along with the development of science, including ergonomic science. Of course, there are some older people who are more open to new knowledge, new information and scientific inventions. This group more easily accepts knowledge of ergonomic and is more susceptible on the shaping of ergonomic awareness.

Developing the awareness is a challenge on many levels. Depending on the group, approaches to this issue differ. Still, it is certainly important both for man, groups and entire societies to ensure that ergonomic awareness develops and systemizes on the basis of knowledge of the subject.

Present elaboration uses results of a survey that examined knowledge of the term of ‘ergonomics’, as well as the term of ‘ergonomic awareness’ and its interpretation in the examined groups. Groups that participated in the survey were:

- academic teachers,
- students of the Poznan University of Technology,
- students of the Poznań University of Economics and Business.

## 5. Analysis of the present situation on the basis of results of the survey

### 5.1. Part one

Examined respondents from the three groups mentioned above had to answer the following question: what is ergonomics and what is ergonomic awareness? A part of questionnaire forms enclosed also a question about how do respondents evaluate their ergonomic awareness and closed questions concerning the best (according to the respondents) way of shaping ergonomic awareness. Examined people were students from different fields of study of the Poznan University of Technology, the Poznań University of Economics and Business, and academic teachers of these universities.

521 responses were obtained in total of the survey, including answers to all questions from the query. 20% of them had to be rejected because of lack of logical relations between these answers and the topic of the research. The first illustration shows results of particular groups of answers.

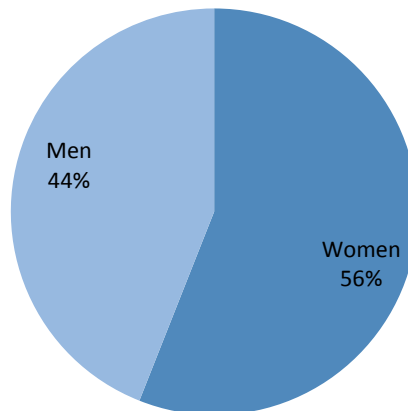


Figure 1. Structure of respondents by gender

Source: Author’s own elaboration based on the research.

The majority of respondents were women—56%, while men were 44% of participants of the research.

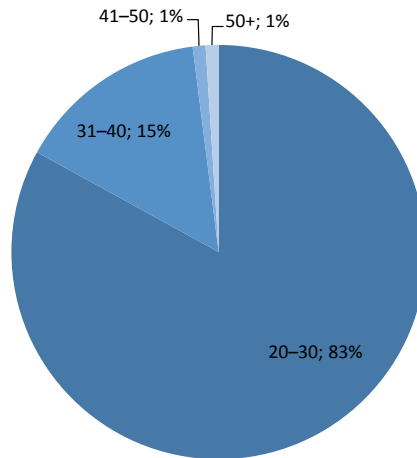


Figure 2. Structure of respondents by age

Source: Author's own elaboration based on the research.

Quantitative data shown in Figure 2 proves that most of the examined people were in the age between 20 and 30 years (83%). The second biggest sub-group was represented by participants aged from 31 to 40 years (14%). Remaining groups enclosed people between 41 and 50 years (1%) and older than 50 years (1%).

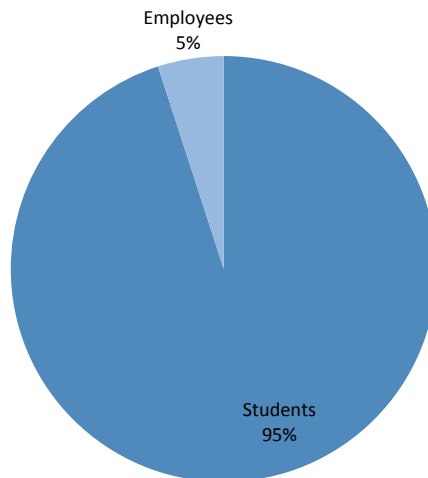


Figure 3. Structure of respondents by their status

Source: Author's own elaboration based on the research.

It is important to underline that as it was shown in Figure 3, 5% of respondents were employees of the Poznan University of Technology. The rest of the examined group were students or graduates.

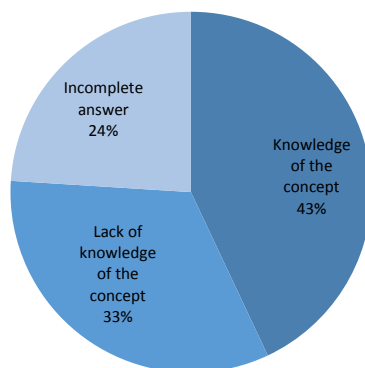


Figure 4. Structure of respondents in view to their knowledge of the concept of ergonomics

Source: Author's own elaboration based on the research.

As it was illustrated in Figure 4, the analysis shows that 43% of respondents know the idea of ergonomics and on this basis they are able to interpret the concept of ergonomic awareness. This part of examined people could correctly define the term of 'ergonomics' and connect this knowledge with the term of 'awareness' in a logical way. Therefore, interpretation of the term 'ergonomic awareness' was satisfying in this group. 33% of respondents did not know at all the concept of ergonomics, so they were not able to interpret the term of 'ergonomic awareness'. Those were mostly people, who confused ergonomics with economics, or who referred this concept to economic aspects of professional occupation. However, 24% of answers were incomplete, only partially correct. This may point at the fact that respondents have met the concept of ergonomics but they do not fully understand it. The majority of examined people relate ergonomics and ergonomic awareness strictly to professional activities.

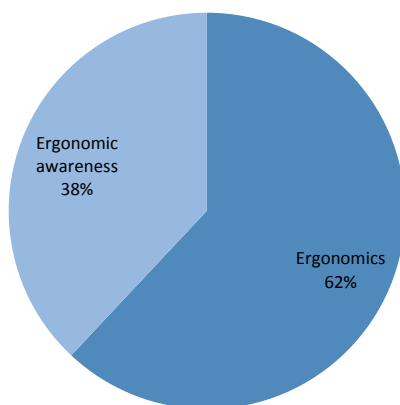


Figure 5. Structure of respondents in view to their knowledge of the concept

Source: Author's own elaboration based on the research.

Figure 5 illustrates the percentage of knowledge of particular terms that were asked in questionnaire forms. In the group of participants who could define concepts presented in the survey in a correct and logical form, 62% answered properly about the term of ‘ergonomics’ and 38%—about ‘ergonomic awareness’. This shows that the majority of examined people know and recognize the term of ‘ergonomics’, while they still do not handle with the idea of ‘ergonomic awareness’. This may result from the diversified interpretation of the concept of awareness itself, but also from the fact that ergonomic awareness is a relatively new term for the respondents.

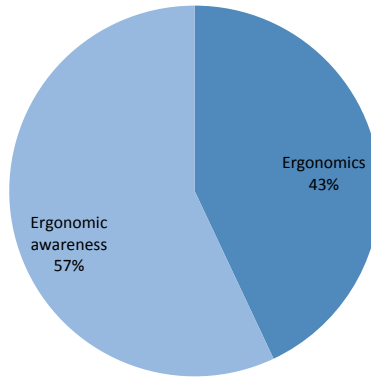


Figure 6. Structure of respondents in view to their unacquaintance of the concept

Source: Author’s own elaboration based on the research.

Figure 6 shows a percentage of unacquaintance of concepts about which respondents were asked in the survey. In the group of incorrect answers, 57% referred to ergonomic awareness, and 43%—to ergonomics. Like it has been already noticed, this may result from the low recognition of the term ‘ergonomic awareness’ and from diversified interpretation of the term ‘awareness’ itself.

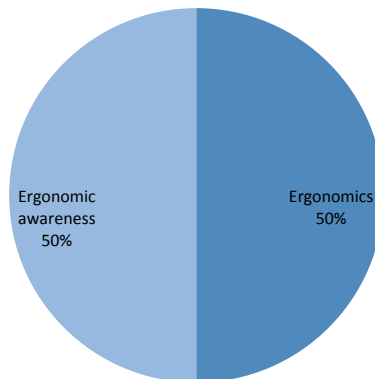


Figure 7. Percentage share of partially correct responses of examined people

Source: Author’s own elaboration based on the research.



The frequency of the occurrence of incomplete answers or partially correct ones was the same for both terms of ‘ergonomics’ and ‘ergonomic awareness’—see Figure 7. Moreover, examined people asked about assessing their own ergonomic awareness gave answers as follows:

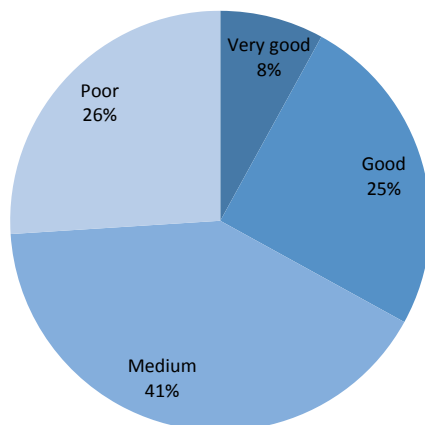


Figure 8. Structure of respondents in view to their assessment about own ergonomic awareness

Source: Author's own elaboration based on the research.

As it was shown in Figure 8, 41% of respondents declared to have a medium level of ergonomic awareness, 26% declared to have a poor ergonomic awareness and 25% stated that they highly assessed their ergonomic awareness. Only 8% declared to have a very good ergonomic awareness. What was interesting, those who assessed their ergonomic awareness as very good or good could not correctly interpret terms from the survey, while people who assessed their awareness as medium or poor could correctly and logically interpret both terms of ‘ergonomics’ and ‘ergonomic awareness’.

Respondents were asked about their opinion on the best ways to shape ergonomic awareness. The majority (88%) suggested the improvement of the didactic process on ergonomics as well as the practical exercises and seminars on the subject. Only 12% of examined people stated that only practical exercises and seminars on the subject would help. Not any respondent gave any other, additional method for shaping ergonomic awareness.

## 5.2. Student's view

This paper has used the survey ‘Świadomość ergonomiczna i jej kształtowanie’ [‘Ergonomic awareness and its shaping’] (Goścień, Krupa, Piechocka, 2017), prepared for widening described research and verifying the knowledge on the principle term connected to the ergonomics and ergonomic awareness. The contents of the survey are presented in Annex 1.

Several dozen students completed the questionnaire. Here below the author presents the analysis of obtained results.

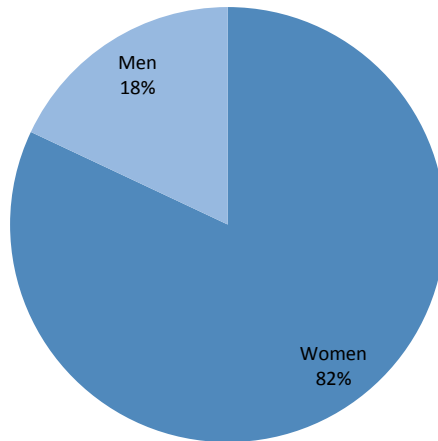


Figure 9. Structure of respondents by gender

Source: Author's own elaboration based on the research.

As it was shown in Figure 9, the majority of respondents were women—82%, while men were 18% of the examined people.

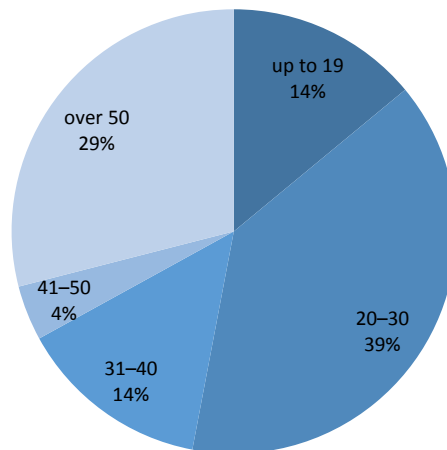


Figure 10. Structure of respondents by age

Source: Author's own elaboration based on the research.

Figure 10 shows the age structure of participants of the survey. The biggest part of examined group was represented by people between 20 and 30 years (39%). The next biggest group was in the age of more than 50 years (29%). People between 41 and 50 years represented the smallest part of the examined group (4%).

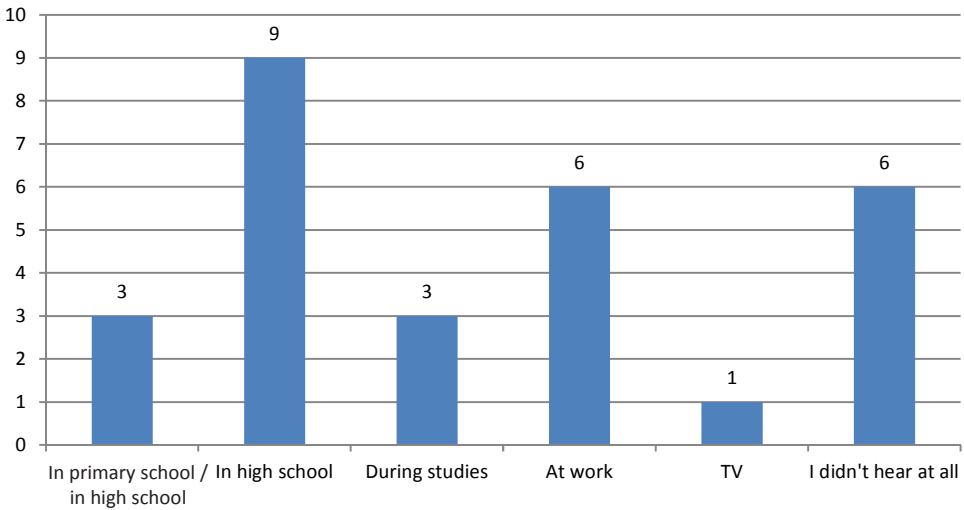


Figure 11. Structure of respondents in view of their first meeting of the term of 'ergonomics'

Source: Author's own elaboration based on the research.

The majority of respondents pointed at secondary school and work as place where they first met the concept of ergonomics (see Figure 11). The smallest parts of respondents declared to hear about ergonomics from the media (only one person) or that they did not meet this concept at all (2 respondents).

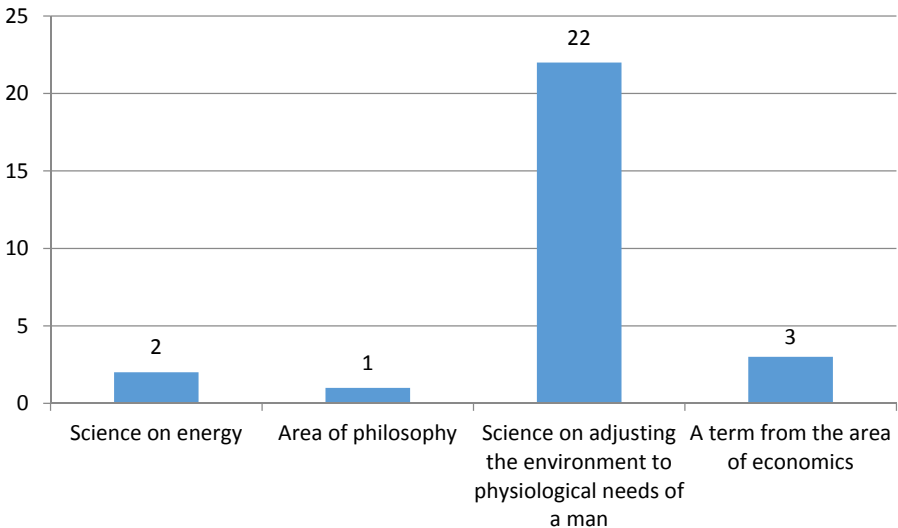


Figure 12. Structure of responses given to the question what ergonomics was

Source: Author's own elaboration based on the research.

In case of the question ‘What is ergonomics?’ respondents mostly pointed at the correct answer (22 examined participants, i.e. 79%), i.e. ‘science on adjusting the environment to physiological needs of a man’ (see Figure 12).

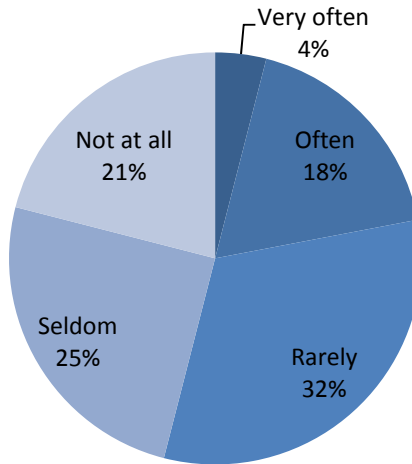


Figure 13. Responses of the examined group to the question: ‘How often in your everyday life do you meet the term of “ergonomics”?’

Source: Author’s own elaboration based on the research.

One can draw conclusion from Figure 13 that the majority of respondents rarely or seldom hear the term of ‘ergonomics’ in their everyday life. 21% of respondents stated that they do not meet this concept. Only 18% of participants of the survey were frequently meeting the term of ‘ergonomics’ and 4%—very often.

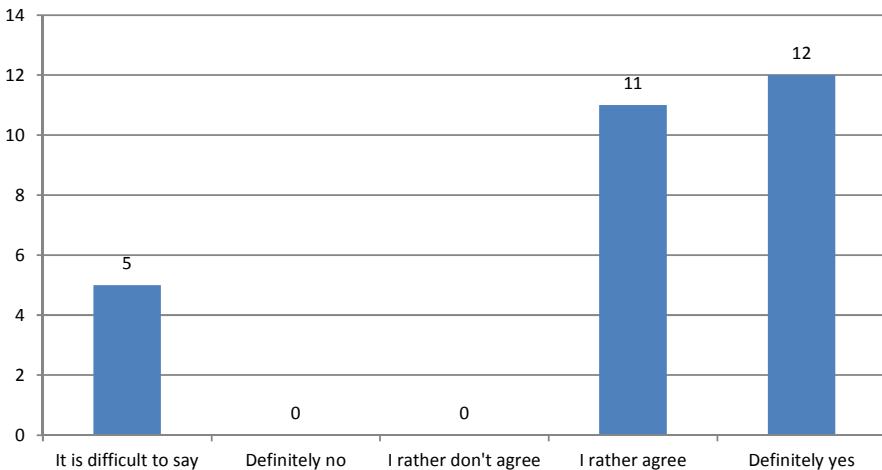


Figure 14. Responses of the examined group to the question: ‘Do you think that following rules of ergonomics in private and professional life is important for man’s health?’

Source: Author’s own elaboration based on the research.

23 respondents think that following rules of ergonomics is important. 5 people have difficulties with deciding whether ergonomics is important or not (see Figure 15).

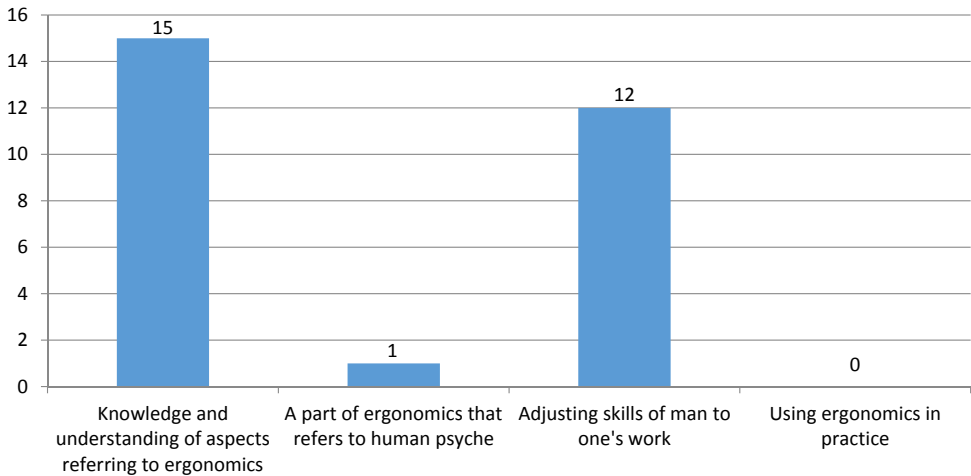


Figure 15. 'What is ergonomic awareness?' Number of answers for particular variants

Source: Author's own elaboration based on the research.

Ergonomic awareness was understood by 15 respondents as 'knowledge and understanding aspects of ergonomics', while 12 people stated that they understand this term as 'adjusting skills of a man to his/ her work'.

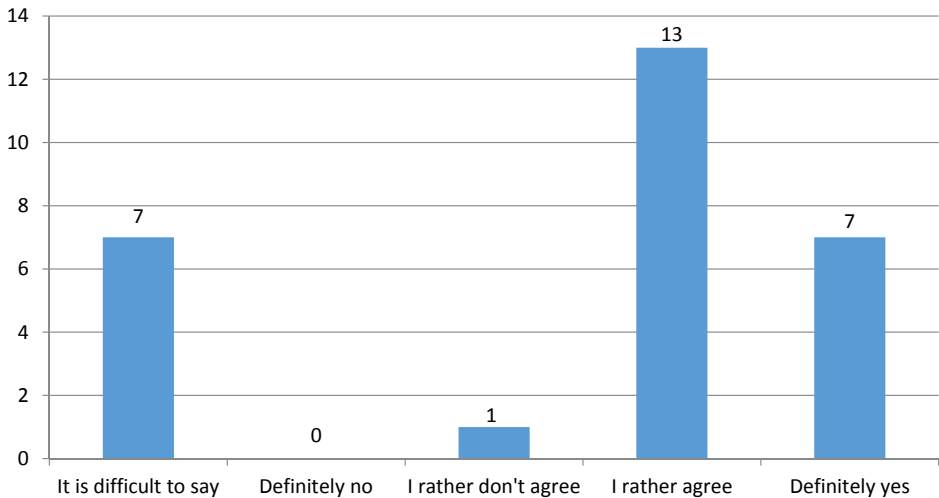


Figure 16. 'Do you think ergonomic awareness should be shaped since the earliest years of childhood?' Number of answers for particular variants

Source: Author's own elaboration based on the research.

Figure 16 shows that 13 respondents think ergonomic awareness should be shaped since the earliest years of childhood. However, 7 respondents did not have their own opinion on this subject.

The questionnaire enclosed also two open questions, to which respondents had to give answers with their own words. The first question: 'What does ergonomics put emphasis on?' obtained correct answers. The majority of respondents related ergonomics to the external environment where man lives. The next question was: 'What kind of actions can be undertaken for shaping ergonomic awareness?' In this case examined people mostly pointed at education. There were no answers relating the subject with methods such as popularization of the topic in media or using advertizing spots.

## 6. Conclusions of the analysis

Students who mainly took part in the survey represented the group aged between 20 and 30 years, with secondary or higher education. The analysis of questionnaires showed that 43% of the respondents know the term of 'ergonomics' and on this basis they can interpret the concept of 'ergonomic awareness'. However, 33% of respondents do not know the term of 'ergonomics' and they do not know how to interpret the concept of 'ergonomic awareness'.

41% of the examined people assessed their ergonomic awareness as medium and 26% assessed it as poor, 25%—declared to have a good ergonomic awareness, and 8%—a very good one. Those who declared to have a good or a very good ergonomic awareness could not interpret correctly terms from the survey, while people who assessed their awareness as medium or poor interpreted these concepts correctly.

An additional, deepening knowledge survey was carried out on the subject of knowledge of ergonomics and ergonomic awareness in the examined group. Most of respondents—32% declared that they first met ergonomics in secondary school. 79% respondents gave a correct answer to the question: 'What is ergonomics?', which was: 'science on adjusting the environment to physiological needs of a man.' The next analyzed problem was the aspect of meeting the concept of ergonomics in everyday life. More than a half of respondents did not meet this term and only 3.6% had any contact with this concept. 82% of the survey's participants think that following principles of ergonomics is important for man's health, however, 18% of them have difficulties with deciding whether ergonomics is important or not. 54% of respondents think that ergonomic awareness is the knowledge and understanding of aspects on ergonomics, while 43% of respondents understand this term as adjusting man's skills to his work. 13% of respondents think that ergonomic awareness should be shaped since the earliest childhood.

## 7. Methods for shaping ergonomic awareness

Methods for shaping ergonomic awareness differ depending on the age of those whom we want to educate. In case of children, on the level of primary school, shaping of ergonomic awareness must be based on propagating proper knowledge from the area of ergonomics, in a way adjusted for children in this age. It can be made by interesting lessons on ergonomics, during which educators could present ergonomics in a positive light, as something good and useful in everyday life, having good impact on our health. It would be also a good method to

organize workshops on ergonomics. Children would actively participate in games and tasks suitable to their abilities and this would facilitate their education of the subject. This form of classes would also make children recognize ergonomics as something positive and form certain habits, and this is a very important aspect for shaping ergonomic awareness.

In the case of young people (i.e. people at secondary school level), not only school classes on ergonomics are needed (in form of theoretical or practical classes, workshops or additional courses). In this case one must use messages in the media, like radio and TV campaigns, social events for promoting positive influence of ergonomics on man's health or promoting pro-ergonomic attitudes. Information in the media and social media would play a very important role for shaping correct attitudes and behaviours.

The formation of ergonomic awareness in minds of adults or elders must be focused on courses, trainings or lectures organized by work environment, but also by the social and scientific environment. In this case it is important to give theoretical knowledge on ergonomics, but also to provide practical classes. In addition, the formation of certain attitudes and behaviours on ergonomics can result from messages from the media, for example advertisement or promotion campaigns that could change the perception of ergonomics and its principles in everyday life.

## **8. Conclusions**

The general knowledge of people on ergonomics and ergonomic awareness is on a medium level. Students and other young people know more about it and notice more aspects related to ergonomics in their everyday life. Older people don't know the concept or ergonomics and they find it incomprehensible. Therefore, one should emphasize more this area of knowledge because ergonomics serves for improving work conditions.

The problem of shaping ergonomic awareness in the society is a very important issue. Research run for needs of the present article are only introducing wider analysis of the subject. Presented research does not extract the topic connected with ergonomic awareness and shaping it in the society. Therefore, the author states that it is necessary to continue research in this area.

# Annex 1

## Survey questionnaire

Gender:

- woman
- man

Age:

- up to 19
- 20–30
- 31–40
- 41–50
- over 50

Education:

- None
- Primary
- High school
- Vocational
- Secondary
- Higher

- 1) Please mark when you first heard about ergonomics:
  - a) in primary school or in high school
  - b) in secondary school
  - c) during studies
  - d) at work
  - e) I didn't hear about ergonomics at all
- 2) What is ergonomics?
  - a) science on energy
  - b) area of philosophy
  - c) science on adjusting the environment to physiological needs of a man
  - d) a term from the area of economics
- 3) How often in your everyday life you meet the term of 'ergonomics'?
  - a) very often
  - b) often
  - c) rarely
  - d) seldom
  - e) not at all



- 
- 4) Do you think that following rules of ergonomics in private and professional life is important for man's health?
    - a) definitely yes
    - b) I rather agree
    - c) I rather don't agree
    - d) definitely no
    - e) it is difficult to say
  - 5) What does ergonomics put emphasis on?  
.....
  - 6) What is ergonomic awareness?
    - a) knowledge and understanding of aspects referring to ergonomics
    - b) a part of ergonomics that refers to human psyche
    - c) adjusting skills of man to his/ her work
    - d) using ergonomics in practice
  - 7) Do you think that ergonomic awareness should be shaped since the earliest years of childhood?
    - a) definitely yes
    - b) I rather agree
    - c) I rather don't agree
    - d) definitely no
    - e) it is difficult to say
  - 8) What kind of actions can be undertaken for shaping ergonomic awareness?  
.....

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## Świadomość ergonomiczna i jej kształtowanie

**Abstrakt:** W artykule przedstawiono problematykę dotyczącą kształtowania świadomości ergonomicznej wśród wykładowców uczelni, studentów Politechniki Poznańskiej i studentów Uniwersytetu Ekonomicznego w Poznaniu. W tym celu na wybranej grupie respondentów przeprowadzono badania przy pomocy kwestionariuszy, weryfikujące znajomość podstawowych pojęć dotyczących ergonomii, a także pojęcia świadomości i jej interpretacji wśród badanych. Przedyskutowany

został problem kształtowania świadomości ergonomicznej w różnych grupach wiekowych. Przedstawiono sposoby kształtowania świadomości ergonomicznej. Wskazano na metody, z uwzględnieniem wcześniej omawianych grup wiekowych. Wyróżniono zarówno działania ogólnospołeczne, mające na celu wykształcenie świadomości ergonomicznej w odniesieniu do całego społeczeństwa, jak i działania indywidualne, kierowane bezpośrednio do konkretnej jednostki.

**Słowa kluczowe:** świadomość ergonomiczna, podstawowe pojęcia, grupy społeczne, konkluzje