Monitoring Cognitive and Mental Abilities of Students

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I. The academic years 2005/2006 and 2006/2007 involve the introduction of two fundamental changes in the Hungarian system of higher education. One of them is the abolition of entrance examinations, and the other is the introduction of the structure of instruction called Bologna Process established in Bologna by the European Union in 1999.

Before 2005 for young people with a secondary school-leaving certificate aiming to continue their studies the only opportunity to enter an institution of higher education was to go through the procedure of the entrance examination first. Due to the large number of applicants to Hungarian institutions of higher education from 1991, this procedure has moved towards formality in the case of less popular major subjects, in the case of current subjects (medical science, psychology, law, economics, communication, English etc.), however, the selection based on the presentation of the thorough knowledge of the subject has not changed ever since. Since 2005 the subject-based entrance examinations have been abolished by the educational administration, and having initiated the system of the two-level secondary school-leaving exam, the qualifications acquired in public education have become the basis of ranking. The school-leaving exam primarily requires the reproduction of the acquired knowledge of subjects even in this new system, whereas the higher level secondary school-leaving exam focuses on the observation of transfer effects, learning abilities (learning competences) in problematic situations. Under these conditions the institutions of higher education do not have first-hand information about the knowledge of admitted students.

Two types of institutions constitute the Hungarian higher education system at present: the system of universities and colleges. There is no free entrance to one another however, since universities only accept a small portion of college studies. Studies of students beginning at college and completed with a university degree can extend the period spent studying with several years. From September 2006 on Hungary will also introduce the structure of higher education, the so called Unified European Higher Education Area by the European Union, which replaces the parallel structure of institutions with the multiple-stage structure, where the two-year masters' course (MA, MSc) is built on the normally three-year elementary course (BA, BSc), and can be followed by the three-year doctors' course (PhD).

Joining the Unified European Higher Education Area in 2006 also involves the reorganization of the structure of major subjects students can choose from. Before the change, students entering Hungarian higher education were given a choice of 413 subjects, however, from 2006 this number will decrease to 102. During this process even majors that used to attract a large number of students will 'disappear'. By merging related subjects, the new variety of major subjects is primarily built on a program on a basis of a wider scale applied in several fields and only allows for diversity at masters' level.

II. Before the above described alterations we provided training in our faculty for applicants to adult education management, employment councelling, cultural management, human management majors on university and college level. With the initiation of the new structure of higher education these majors will cease to exist, or rather merge into the newly established andragogy major, and after the fourth semester become its specialized subjects (andragogist, specialization in adult education management, employment councelling, cultural management, human management). Therefore from September 2006 the instructors in our

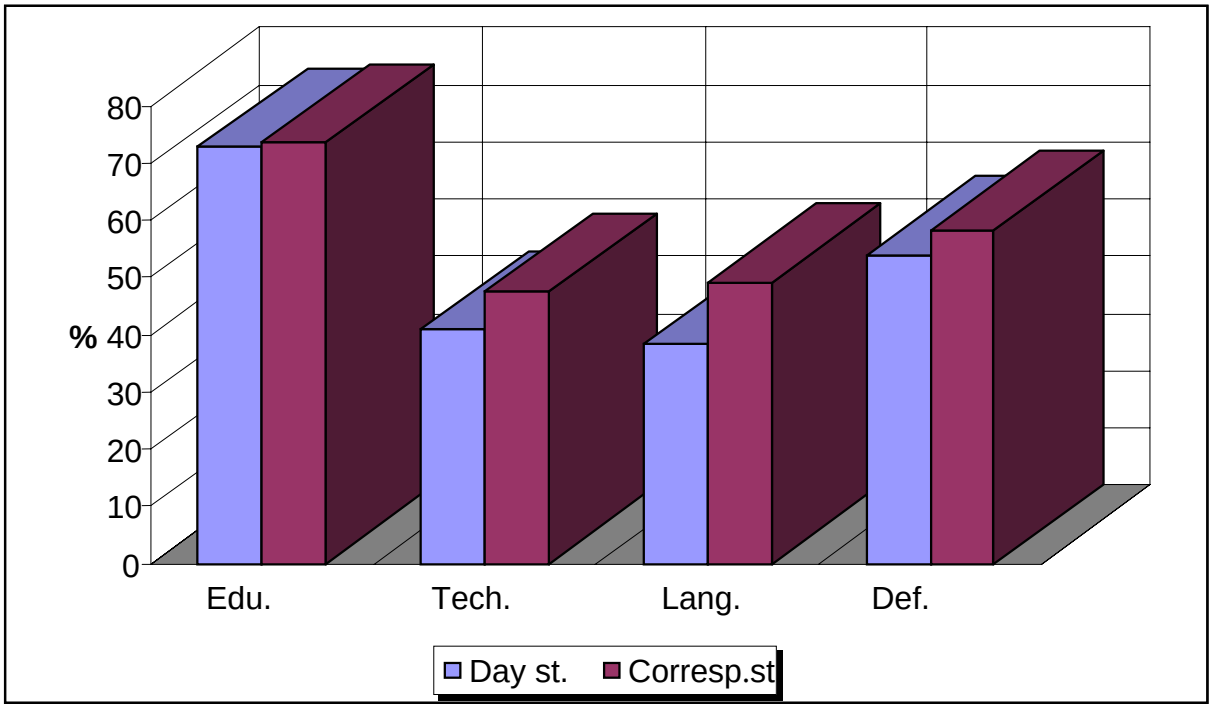
faculty will meet completely new challenges regarding both structure and contents, while the law of higher education introducing the new system and the accreditation at institutions makes continuous monitoring and keeping track of the work and career socialization of its students compulsory for universities. We intended to make arrangements for this latter requirement with a research surveying our first-year students launched in September 2005. We were motivated in the planning on the one hand by the idea of getting acquainted with the learning abilities -cognitive and individual competences- of our students, and on the other hand, by the foundation of the base of comparison of researches to be conducted in the new higher education system and varieties in training programmes. These students started university with the old structure and choice of majors, but were admitted to our university with the new procedure that does not require an entrance examination, thus they can fulfil their role to compare due to their 'transitory' state.

At the stage of planning our project, we considered the fact that our students partially come from the age group tested by the PISA-surveys, and whose performance resulted in a relatively big debate among Hungarian experts. For this reason we considered including numerous reading comprehension tests and mathematical logical ranges of tasks highly important. We have recorded all the data about all the students admitted to the above mentioned majors in our university, we have completed our data base with that of nine partner institutions which have joined our project. We have tested 2747 people altogether in the ten institutions, this number exceeds 75% of the students enrolled in these majors in 2005 in Hungary.

III. We have carried out the survey of data in the partner institutions according to research norms. The first section in the survey book served for mapping the social-cultural background with the documentation of nearly 50 data. The second section included a reading comprehension test a) with an educational text – see appendix –, b) with a technical text, c) testing language usage, d) about definitions of abstract notions. The diagnostic power of the selected paragraphs have already been proved in other contexts. The third section included mathematical logical tasks, none of which, however, required detailed calculations exceeding the average level of tasks at secondary school, each could be solved by simple deduction or comprehending as 'a good whole'. The fourth section aimed at analyzing the psychological immune system of the students. The diagnostic impact of the latter two sections had been tested previously in an international contrastive analysis. Now we are going to present a report on our results concerning the tests on reading comprehension.

One could easily assume that in the case of the four ranges of tasks analyzed in the scope of reading comprehension there would be a great difference between the performance of day students and correspondent students in favour of day students. This presupposition was supported by the fact that the average age of correspondent students exceeded that of day students by over ten years, and besides, during these ten years they were not able to get into institutions of higher education either, they waited –apart from exceptions- or had to wait for the opportunity of admission without having to take an entrance examination. Despite this fact, correspondent students preceded their much younger fellow day students in every range of tasks (Chart 1). The here experienced tendency applied even within shorter periods among our tested students. We ranked our day students into three consecutive age groups according to the date of their secondary school-leaving examination. We found that the performance of those with an earlier date of their secondary school-leaving exam gets higher and higher every year (Chart 2). This tendency does not include the performance of students with a higher level secondary school-leaving exam taken in 2005 (Table 1), which exceeds the level achieved by

correspondent students in the case of the educational texts and the definitions of abstract notions. It can be observed in both programmes, however, that their performance in tasks on technical texts and language usage does not reach 50%. Consequently, in this grade comprehension or learning problems are expected to occur.



Abbreviations: Day students: Day st.; Correspondent students: Corresp. st.; Educational texts: Edu.; Technical texts: Tech.; Texts testing language usage: Lang.; Texts with definitions of abstract notions: Def.

Chart 1. Performances of day students and correspondent students in the case of various types of texts

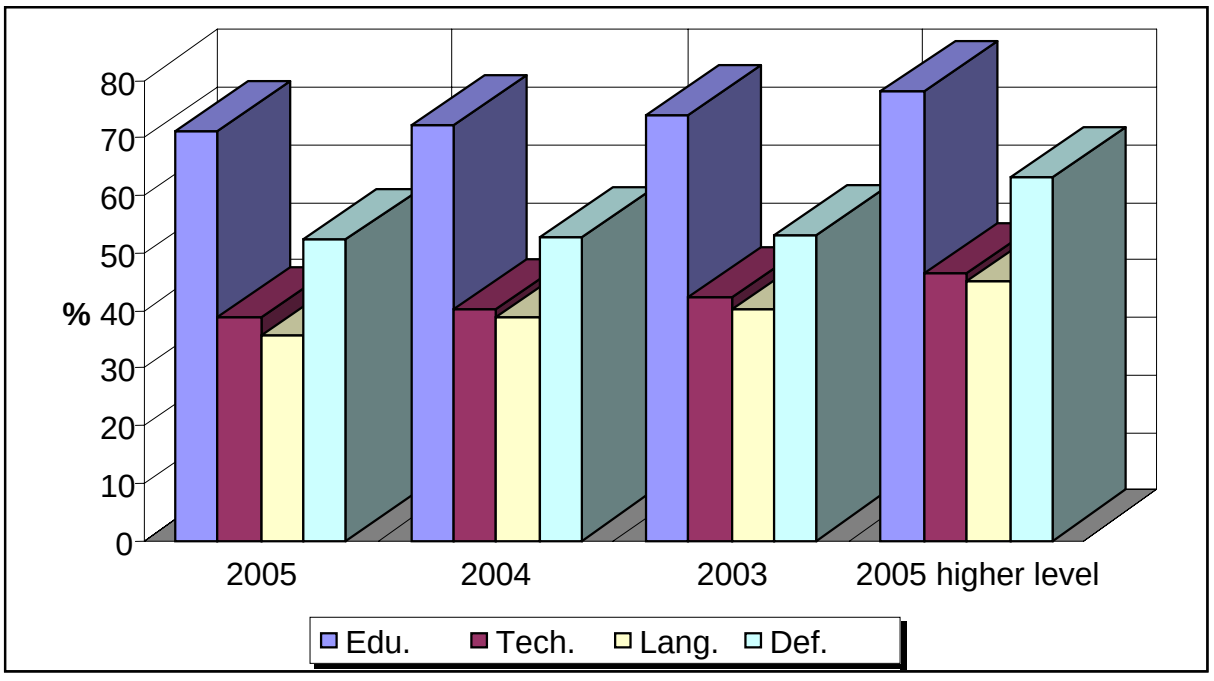


Chart 2. Performances of day sudents with secondary school-leaving exams taken in consecutive years in the case of various types of texts

Naturally, the recruitment areas of our students accomodates to the location of the institutions joining the research in the country. For this reason, there are people coming from small villages, small towns, big cities and also the capital city in our sample. Our data show that the effect of the so called ’area slope’ can also be demonstrated in the scope of reading comprehension in the case of students enrolled in higher education (Chart 3). This suggests that the smaller the place where one lives, the more likely they are to have a weaker performance (Table 2).

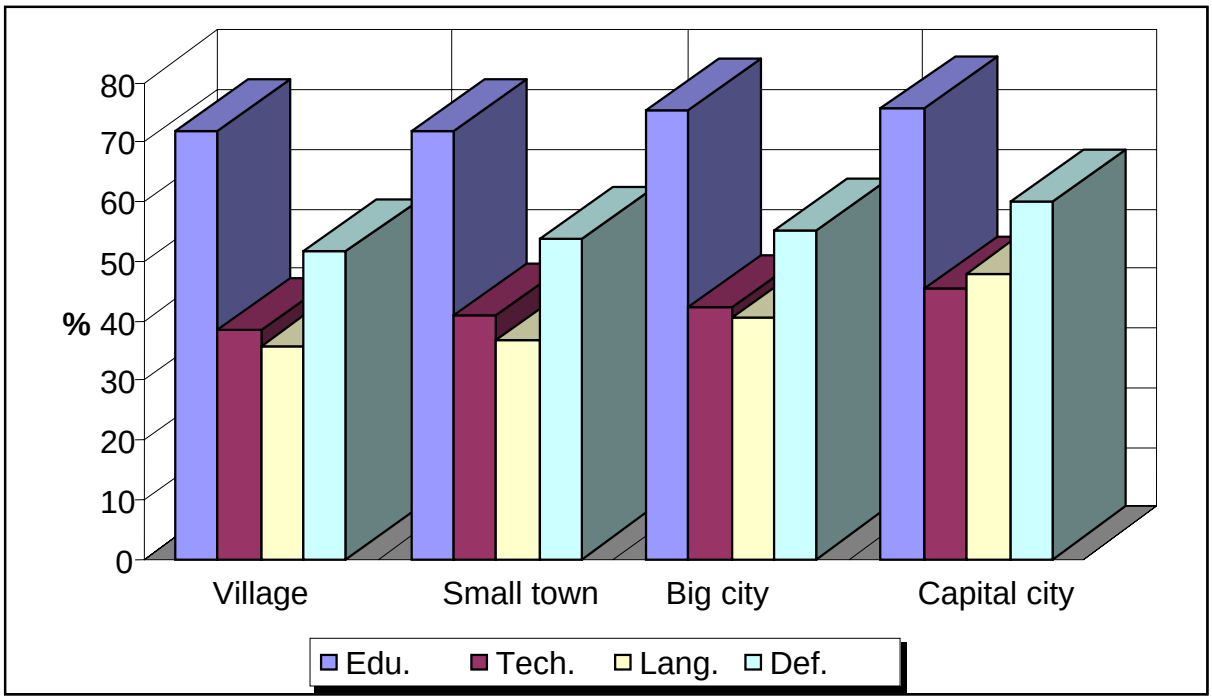
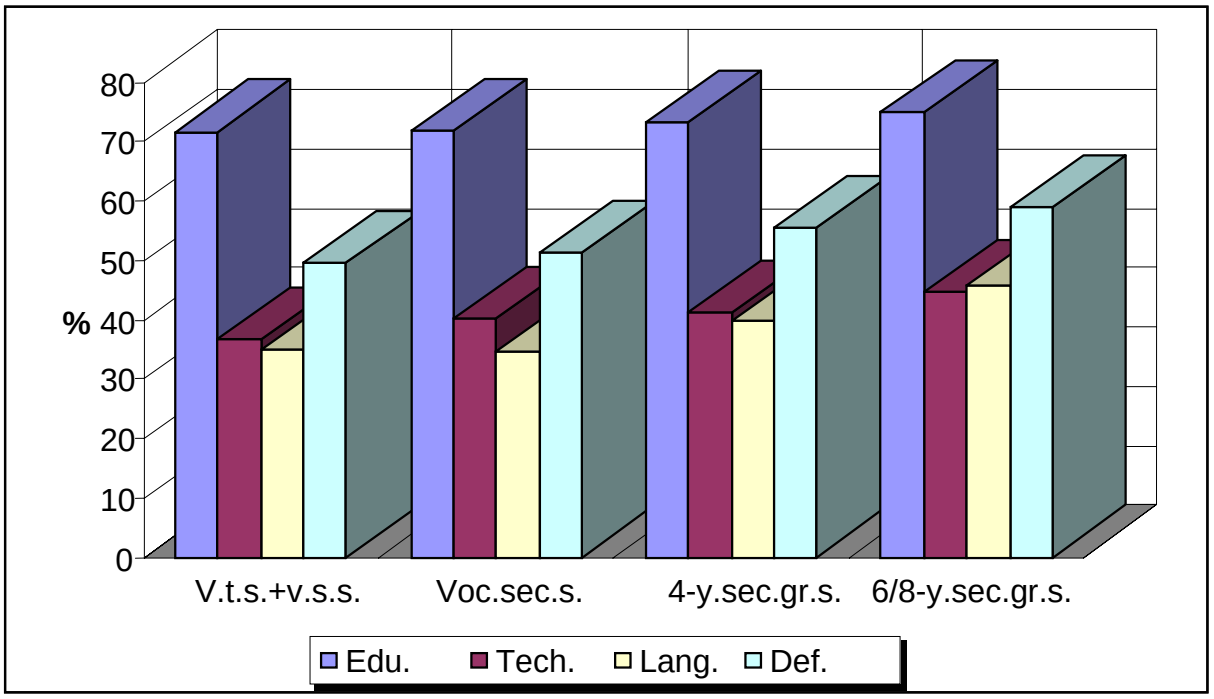


Chart 3. Performances of day students from various types of communities in the case of different text types

Since September 2005 our students have been able to get into institutions of higher education on the basis of the results of their secondary school-leaving examination. Universities and colleges are expecting applicants to programmes financed by the state and fee-paying studies. However, there is usually great overenrolment in state-financed programmes, consequently, a remarkably high number of points, often a higher level secondary school-leaving exam is needed to enrol. Students from all types of secondary schools can apply for the higher level secondary school-leaving exam, but secondary grammar schools offer a more efficient preparation from the most frequently selected subjects of general knowledge. The difference between secondary schools can also be seen in the performance of students tested on their reading comprehension skills (Chart 4.). Students having taken their secondary school-leaving exam in a grammar school with a 4-year programme have advantages over their fellow students having finished vocational secondary school. It can also be observed that the performances of students with a secondary school-leaving exam taken in a grammar school with a 6 or 8-year programme are the highest. The early selection of the more successful students probably plays a role in it at least as great as the provided educational merit of the given schools. While the above mentioned tendencies predominate in the field of reading comprehension, in the case of logical thinking the performance of students at vocational secondary schools exceeds that of students graduated from secondary grammar schools. Here we must mention that in the solution of mathematical

logical ranges of tasks day students proved to be more successful, their performance, however, could not reach 30% of scores to achieve either.



Abbreviations: Vocational training school + vocational secondary school: V. t.s.+v.s.s.; Vocational secondary school: Voc. sec. s.; 4-year secondary grammar school: 4-y. sec.gr.s.; 6 and 8-year secondary grammar school: 6/8-y. sec.gr.s.

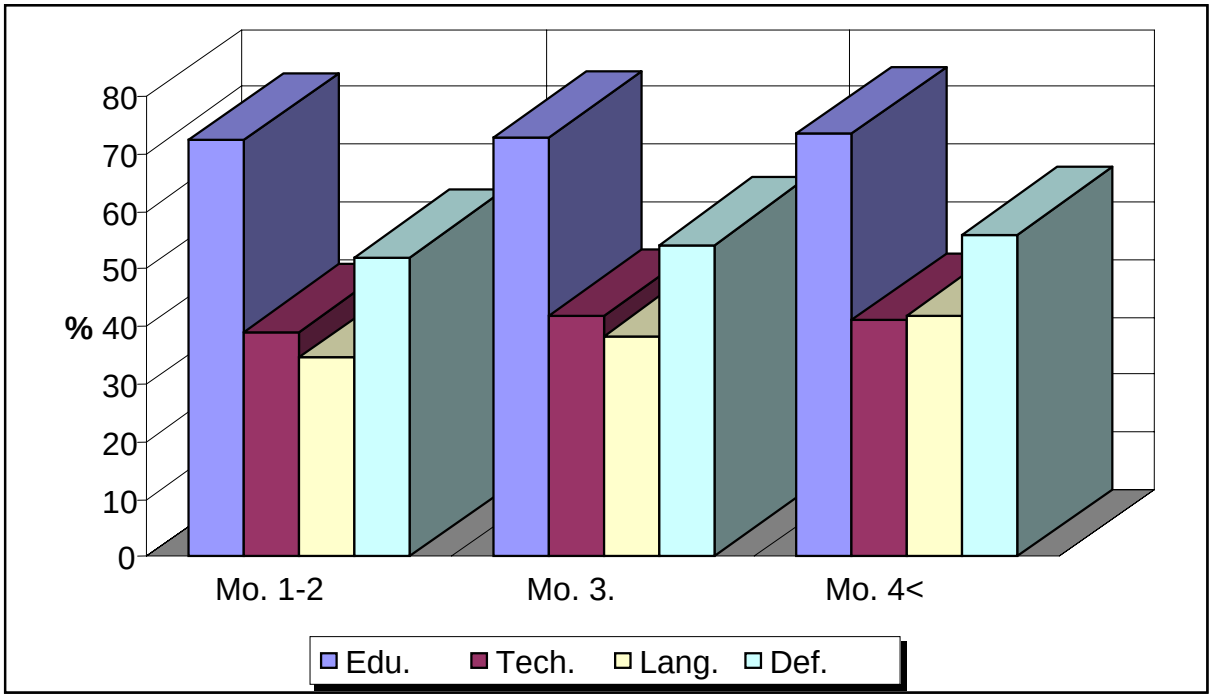
Chart 4. Performances of day students with secondary school-leaving exams taken at various types of secondary schools in the case of different text types

We have analysed the effects of the educational level of parents on the performance of our students. We have found that the studies of both parents may influence the performance of their children , in our statistics, however, the impact of the mother is more balanced (Chart 5). This effect is also predominant among correspondent students over ten years older than the average.

Among day students in the performance on the solution of mathematical logical ranges of tasks the impact of the educational level of parents only plays a limited role. In the case of our correspondent students, however, the influence of both parents fits into a linear trend.

The correlation coefficient of the cumulated results of the reading comprehension tests and the mathematical logical tasks show a weak moderate correlation, the coefficient is significant at $p<0.001$. According to the intension of the inventors of the tests in the case of accurate reading comprehension the majority of the logical tasks could be solved. This explains why a lower level of comprehension of technical texts was likely to have contributed to the weak performances on logical ranges of tasks.

The level of reading comprehension skills explored in our research urges the institutions of higher education to draw the conclusions from the emergence of mass education on the one hand, and the tendencies in Hungary experienced in the scope of verbal communication on the other, in order to facilitate a possible therapy, or the reduction of obsticles experienced in students' efforts as well.



Abbreviations: Educational level of mother: elementary school or vocational training school: Mo. 1-2.; Educational level of mother: secondary school-leaving exam: Mo. 3.; Educational level of mother: college or higher: Mo. 4<

Chart 5. The level of education of mothers and the performances of their day student children in the case of different text types

In this study we endeavoured to present the outline of a project which is to set up the constant monitoring of students and graduates initiated in higher education from the following years. In this process we set significant importance on reading comprehension, the performance on which depends considerably on the social-cultural background (educational level of parents, type of community, type of school etc.) of the students under the specific circumstances in Hungary.

Tables

Table 1. Performances of day students with secondary school-leaving exams taken in consecutive years in reading comprehension and mathematical logical tasks

Research areas	s.s.l.e. 2003		s.s.l.e. 2004		s.s.l.e. 2005		h.l.s.s.l.e. 2005	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Total number of language certificates	,63	,663	,48	,597	,49	,633	1,17	,592
Camels-total number of correct answers	4,43	1,140	4,34	1,228	4,27	1,231	4,69	1,004
About thinking-total number of correct answers	2,96	1,448	2,81	1,424	2,72	1,383	3,26	1,447
Speaking in Hungarian- total number of correct answers	2,41	1,780	2,32	1,706	2,13	1,653	2,71	1,803
The social concerns of physics- total number of correct answers	2,66	1,392	2,64	1,346	2,61	1,302	3,15	1,275
Total number of correct answers in reading comprehension tests	12,46	4,071	12,11	3,766	11,73	3,579	13,81	3,660
Logical test- total number of correct answers	4,33	1,982	4,02	1,881	4,21	1,993	4,63	1,996
Valid N (listwise)	407		435		973		299	

Abbreviations: Secondary school-leaving exam, 2003: s.s.l.e. 2003.; Secondary school-leaving exam, 2004: s.s.l.e. 2004.; Secondary school-leaving exam, 2005: s.s.l.e. 2005.; Higher level secondary school-leaving exam, 2005: h.l.s.s.l.e. 2005

Table 2. Performances of day students from various types of communities in the reading comprehension and mathematical logical tasks

Research areas	Village		Town		Town of county rank		Capital city	
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation
Total number of language certificates	,51	,642	,55	,646	,80	,710	,72	,637
Camels-total number of correct answers	4,31	1,203	4,31	1,220	4,52	1,123	4,53	1,116
About thinking-total number of correct answers	2,70	1,401	2,85	1,391	2,96	1,493	3,17	1,398
Speaking in Hungarian- total number of correct answers	2,15	1,633	2,21	1,707	2,43	1,777	2,88	1,783
The social concerns of physics- total number of correct answers	2,59	1,291	2,69	1,359	2,75	1,312	3,00	1,393
Total number of correct answers in reading comprehension tests válaszainak összege	11,75	3,618	12,07	3,808	12,66	3,716	13,56	3,937
Logical test- total number of correct answers	4,29	1,975	4,23	1,943	4,26	2,002	4,22	2,047
Valid N (listwise)	630		839		422		218	

Appendix
Camels

In our first experiment the researchers did not give water to the camel for eight days. The camel lost 22% of its weight, approximately 100 kilos. When it was finally given some water, it emptied one bucket after the other, it began to fill out gradually, and soon gained back its original weight.

A camel can lose 25% of its weight by evaporation without its life being in danger, whereas a 12% loss of a man's weight by evaporation in the desert is fatal. The researchers, who were fond of animals, did not dare to try, how long a camel could live without water. The camel which could endure the longest without water, drank 135 litres of water in 10 minutes after 17 days of thirst.

A camel can make better use of a little amount of water than a man. Moreover, it can also control the evaporation through its body better than a man. If a man is to stay where the temperature is higher than the normal temperature of their body, they begin to perspire in order to prevent an insrease of temperature harmful to the body. The control of a camel's body temperature is different. When the sunshine keeps getting hotter and hotter, the body temperature of a camel adjusts to the temperature of the environment. It only begins to perspire, when the temperature of its body reaches 40 degrees. When the cold desert night comes, the temperature of the camel drops to 34 degrees. This 6-degree change in the temperature means that a period of the day has to pass long enough for the camel to start to perspire.

1. The primary goal of this text is to explain
   A) why a camel can lose so much from its weight.
   B) why a camel can drink so much water.
   C) why a camel does not perspire.
   D) why a camel can adapt so well to desert conditions.

2. A camel can control the evaporation through its body better than a man. This means that
   A) a camel can start or stop perspiration whenever it wants to.
   B) a camel has more sweat-glands than we do.
   C) a camel reacts to even the slightest change of temperature.
   D) A camel does not start perspiration as soon as a man.

3. The physiological function of perspiration is
   A) to prevent drop in the body temperature.
   B) to regulate the balance of salts of the body.
   C) to remove bodily fluids.
   D) to extract heat from the organism.

4. When the temperature exceeds 34 C, the camel
   A) begins to perspire considerably.
   B) saves energy.
   C) experiences an increase in body temperature.
   D) controls water consumption.

5. The coherence between the first and the second paragraph of the article is that the second paragraph
   A) explains the facts listed in the first paragraph.
   B) provides further details about the ideas in paragraph 1.
   C) gives a more technical discussion of the information than paragraph 1.
   D) contains different aspects from the first one.

6. According to the text, how much is the estimated weight of a camel?
   A) 100 kg.
   B) 500 kg.
   C) 2200 kg.
   D) No information.