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Primary School Teachers in the Information Society

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Abstract: This study represents a survey approach in order to analyse the information society in a regional setting. The first part deals with a current problematic issue: the human resources of the information society, which is a neglected research area of the information society. The second part of the paper will point out the main characteristics of the human adaptation of the information society. My aim is to accentuate the importance of the 'human-interface gap'. These days the accessibility is strongly connected to the education and to the fact that several jobs do not require competence in digital or information literacy. Focusing on the human aspect has become a central issue of the higher education, and one of its prominent tasks, besides others, is to prepare the next generation for the challenges of the information society.

Keywords: school, teachers, information society, competence of digital literacy
Categories: K.3.2, K.4, K.4.1, K.4.3, J.4

1 Introduction

We are living in an information society, even if its beneficial effects (suggested by political publicity campaigns) cannot always be realized. Moreover, by the time the documents of a nationwide policy (which is expected to be issued soon at regional and micro regional levels, too) have been done, there is already a new concern in the political focus: the importance of the formation of a knowledge-based society [HISS, 03]. The knowledge, itself, which is the basis of a knowledge-based economy and society, in fact, comes from the education.

Teaching in a primary school as a specialization, and teaching in general as a profession has always had a special role, not only in the higher education system, but similarly in everyday life, too. We put the education of our children in the hands of educated people trained in teacher training colleges and departments of universities. These people help our children to take the first steps in the process of gaining the so called 'classical knowledge'. Through the changes of the higher education system (Bologna process), which is in progress at the moment, the old questions regarding education have been brought up again with being placed even more emphasis on them and giving them a wider publicity. These are, among others: Is the current 'traditional' structure of the primary school teachers' training the most appropriate? Does the curriculum contain all the necessary knowledge for teaching? Will the primary school teachers have the fundamental competence with which they will be able to teach the next generation? What sort of knowledge, skill is needed for the development of the ability necessary for life-long learning?

Apart from questions of qualities and quantities, one thing is certain: a teacher is used to be a child, too. We do not know, however, what sort of school and teacher she

or he had. Are the learning abilities, most of which acquired 15-20 years ago, still sufficient and adequate nowadays? What should a teacher learn so that he or she could conduct the learning process of the children as a competent person?

The acquisition, organization, storage and transmission of the knowledge need new, special teaching-learning methods, and these new methods are associated with the facilities of the recent technology, or more precisely, with the infocommunication technologies (ICT).

2 Target of the research, and its foundation

The facilities of learning and the methods associated with them have been changed radically, while the form of a traditional class (with the personal contact between teacher and students during the lesson) has prevailed in Hungary. You need to study. This basic principle has not been changed; there is a persistent demand for the so called 'classical', traditional knowledge. The students, the prospective teachers have to learn and understand the essence of the learning process and the teaching methods in order to be able to apply them during their work later.

This study is intended to present the current findings of an empirical research, which is aimed to assess the Szent István University College student's preparation level for the challenges of the information society. One of the goals of my research is to point out the basic competence in digital literacy for teacher training at BA and BSc levels.

The other area examined is the detection of factors related to spatial dispersion, and their presentation by GIS devices. This sort of researches with a geographical aspect can illustrate the equipment-specific and non-equipment-specific forms of accessibility and exclusion in relation to the information society in its own complexity. There is also a spatial diversity in basic competence. The social, cultural and economic factors are those, which determine the forms, methods and the extent of the comprehension of the new information (i.e. digital literacy). Most of our students after their graduation try to find a job locally or within the region. How does their knowledge contribute to the development of their settlements, region? Does it help in reaching the critical mass of the information society? This critical mass can be defined as the spread of ICT equipment, their growing usage in social and business relations.

The focus of the research is not related directly to information technology, but primarily it is aimed to detect the presence of competence-based, problem-solving skill and knowledge. There are further academic courses led by myself that are also linked to this programme, such as (theoretical) lectures about 'Information Society', and 'The Geography of Information Society' seminars, both of which are intended to develop the essential competence in digital literacy, and at the same time providing opportunity of analysis for the current research.

The main examined parameters of the survey carried out among the students are: PC and Internet usage, the penetration level of ICT devices used by them, its spatial diversity, ICT devices used by the students; attitudes, study habits related to eLearning – either through the Internet, or as an additional component of the traditional lesson in classroom (blended learning).

Topic-based experiments (subject development) are also carried out in order to provide the most optimal skills development tasks for the students while they become aware of the potentialities and the demands of the next generation.

Primary school teachers have to prepare for a situation in which they are going to teach such children who have been brought up with a PC around them. However, the PC and the Internet are not or only very rarely used as a teaching aid. There are even less signs of the phenomenon that the curricula and the contents of the books, usually written many months or years before, would be supplemented with up-to-date information, the results of recent researches - by the primary school teacher. Perhaps young pupils sitting frequently in front of the PC could be made receptive to playful learning, since a child's natural environment is playing. Our teachers at primary schools are needed to be made prepared for this challenge, and if we are able to smuggle the proper method into the exhausting process of learning (and teaching), which would be, in fact, play for the child, then, additionally, we might well make them learn, too.

3 The levels of the research

This research is being carried out at different levels [Webster, 95]. The results of a complex geographic analysis point out the spatial aspects of accessibility and exclusion, and signify a very problematic area defined by myself with the term of human interface gap (HIG), which will be detailed below. I am going to use thematic maps to illustrate what sort of human resources the college has in terms of prospective candidates, and within that, what sort of differences can be recognised.

In my view the morphologic picture of the traditional human resource maps are largely influenced by the existence or the lack of the basic skills, which are essential in an information society.

3.1 Technology level

At this level of the research, similarly to other information society researches, the technological factor is examined. From the point of view of such researches in which the ICT component is in the focus *"technology is independent, active and predominant, while the self of the culture and of the human is subordinated, passive and only able to respond."* [Mészáros, 03]. The central issue of this level is the rate of the spreading of the new infocommunication technology as well as its role, significance, localization and dynamism; that is, the infrastructure of the global information society.

3.2 Sociological level

One of the most significant areas at this level is the detection of the social and spatial manifestations of accessibility and exclusion. This topic is connected to such social science researches (discourses), which are aimed to analyse and process the statistics of the economy and employment structure. The most relevant issue is the ICT's

- role in the production process
- its internal convergence

- evolution in an environment of new types of skills and knowledge linking to this
- and the role of the human resource applying this technology.

3.3 Critical mass surveys

Information Society Critical Mass (ISCM) means the particular extent of distribution and acceptance of ICT that is resulted in a change of quality in the social and economic processes. Critical mass surveys and calculations measuring the rate of social development play a very important role in the examination of the structure of the economy and employment as well as the technology. One of the most known international examples of this is IDC research [IDC, 05] [Sinka, 04].

Hungarian researchers are also involved in the examination of the problem. One of the most successful domestic examples, with about 30 indices in 6 index groups, rates by counties, and makes an attempt at defining the level of development of the information society in Hungary [Kanalas, 03b].

3.4 Globalization and media-culture studies

The economic globalization has not left the traditional values of the Hungarian culture unaffected either. An increasing interdependence can be seen between the economy and the culture presented through the media, the impact of which is manifested as the most significant process of the age.

This level of the research attempts to find the answer to the question how the local values are influenced by the values generated by the global culture. How does it influence the personal and interpersonal/social relationships, consumption patterns? What sort of changes is taking place in obtaining, organizing, storing and recycling information? The examination of the presence of local values on the Internet (portal research, content analysis) also belongs to this field.

3.5 Spatial structure researches

The transformation of a spatial structure is the most exciting area for a geographer. Spatial theories set the networks of towns, the globalizing world into the centre of the examination again as foreign bodies embedded in the industrial social space [Castells, 98]. One of the principal questions of the theoretical approach is how a person's local identity is changing. Does spatial arrangement follow a network pattern?

The goal of this research level is to discover the internal logical connections of the network structure, to comprehend

- who is inside, and why
- what is needed for entering and staying in
- to what extent ICT determines the structure of the inner connections
- with what sort of morphologic characteristics can it be defined

The results of a geographical space research is always analysed through the examination of the internal phenomena running in it; its inner structure and relations between the components. These spaces, space elements are social-political-economic products. Some of its particular elements are stable, while others are reproduced from

time to time – but rarely in an identical form, occasionally bearing natural-environmental features of great importance [Mészáros, 00].

3.6 Human resource mapping

Mapping of the statistics of human resources has been used by geographers for a long time. The classical and the competence-based human resource mapping are very similar in one common feature: both are based on the analysis of the data at their disposal about the formal education and qualification of the population. Competence-based HR mapping, however, strives to involve such new factors and parameters (with making them able to be measured) that meet the demands of the information or knowledge-based society.

This area is one of the main specifications of my research. Its findings are going to be outlined below.

4 Spatial arrangement of the human resources; the main aspects of human adaptation

The cornerstone of the Hungarian information society development is the appropriate condition and composition of the human resource. The global culture based on ICT and its economic challenges has been forcing all areas of the education system for a paradigm shift. In agreement with other researchers I believe that the regional differences of the information society's adaptation level in Hungary can be derived from the spatial differences of the human resource base [Z. Karvalics, 02], [Kanalas, 03a, 03b], [Pintér, 03].

One of the most important components for the information society's development is the human resource. We should imagine such a cyclical process in which the cultural and educational development determines the technological development, which determines the economic development, which determines the social development, and which determines the cultural and educational development, etc [Z. Karvalics, 02]. The role of the prospective teachers is twofold: on the one hand as young people, on the other hand as teachers playing a prominent role in the education system, they have to prepare for the challenges of the global information society.

4.1 Where is the next generation?

My hypothesis is that the geographical differences influence the extent of participation in digital communities and the progress of the information society [Sinka, 04]. In Hungary, it has only been recognized – and acknowledged – very recently in the education policy that the reading and writing skills of the students in primary and secondary schools are poor [PISA, 03]. Teaching foreign languages, similarly to the IT subjects, has a high number of lessons in the syllabus, while the acquisition of the mother language is neglected. A foreign language, however, cannot be learn without a sound base of knowledge in your mother language, and the decline of the reading skill makes it almost impossible, but at least difficult, the evolution of the skill of life-long learning (LLL) [Magyar, 05].

The chart below shows two different aspects: the age, and the qualification of web users. The empirical data seem to prove my hypothesis (right) about the human gap. (I.e. the gap we can find in the correlation of age and qualification.) Nowadays a typical user in Hungary has completed his or her secondary studies (B2) or has a college, university degree (C). Interestingly, the proportion of web users is the lowest in technical schools (B1). (The lack of internal drive and competence will cause serious problems in the process of IS adaptation later.) It can explain why the efficiency of the central information society programs is low. The accessibility is strongly connected to the level of education. The large number of jobs does not require the competence in digital or information literacy.

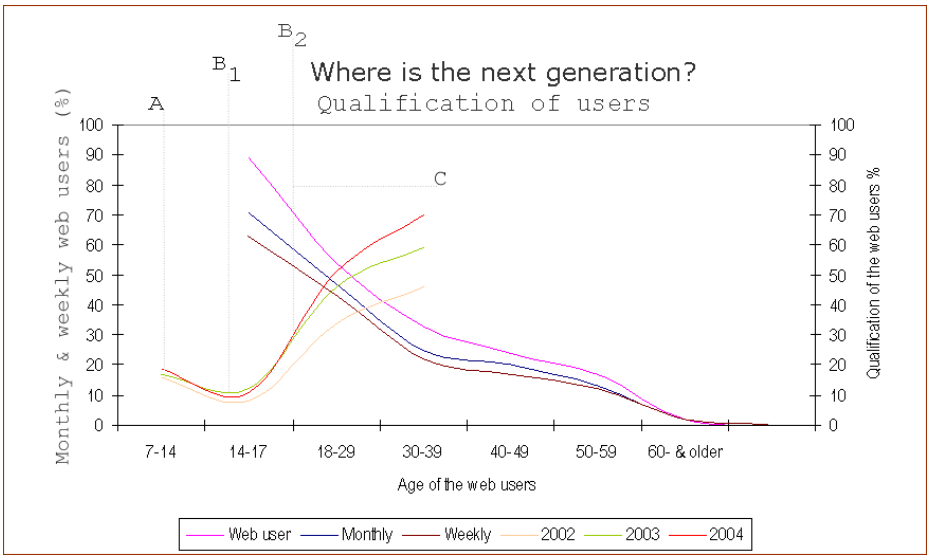

Figure 1: Human Interface Gap of R. Sinka - ICT users – A) primary school, B1) industrial (technical) school, B2) secondary school, C) university or college [made by the author]

The chart (made by the author of this study) is based on the Hungarian Information Society's annual report 2004 [HISAR, 04]. The data of my personal research corresponds to the nationwide statistics, too. Among the population aged between 14 and 18 years, the academic qualification and the use of the Internet shows an ideal ratio for reaching the level of the so-called critical mass of the Hungarian information society. In their case the most common access points (workplace, school, home) are still harmonize with each other, since the school and the workplace, at this stage, are usually the same. Later, when the workplace becomes separate from the school the change is radical. The low rate of students from technical schools shows that the majority of jobs do not represent real motivation for ITC use (Internet access, PC use, etc.). The widening gap between the 'arms' at the right of the chart, points out the Human Interface Gap (HIG). In fact, the HIG is a discrepancy between the potentialities offered by the modern technology and the user's competence. The lack

of the internal drive and the lack of competence cause serious problems in the process of information society adaptation later. It can explain that the efficiency of the central information society programs is low. The accessibility is strongly connected to education. Most of the jobs do not require the competence in digital or information literacy [Sinka, 05].

5 Data collection, database planning

The pilot phase of the research has been completed. (This has been used for this study, too.) In this part there were two main areas in the focus. One is data collection; the other is data processing (analysis) and presentation by geographic information system (GIS) devices.

This work has not needed any special hardware until now, only a simple PC. It is the AutoCAD software exclusively, that requires special power source. It will be inevitable, however, for the continuation of the research an independent database server to be configured.

5.1 Data collection

During the planning of the research I have examined what fundamental data is available to support my hypothesis (see 4.1). The first database is derived from a survey based on a questionnaire [ISERC, 05]. This data source has been processed with the SPSS (Statistical Package for the Social Sciences). After SPSS processing the input and output data of the analogue, paper-based questionnaires has been at our disposal in digital format. The other alphanumeric database is from the student registration database of the university college (called NEPTUN).

The map database relevant to the processing and presentation was already available in digital format.

5.2 Databases connection

Joining of the graphic and the other two alphanumeric databases was only partly successful. The survey by questionnaires did not contain such a data that would have been suitable for geocoding. (A geocode is a geographical code to identify a point or area at the surface of the earth.) Although the survey met the sociologic requirements, it was unsuitable for the presentation of the results within the GIS.

The chart below summarizes the main characteristics of each database.

Name of database	**Questionnaire**	**NEPTUN**	**Digital Maps**
Type of database	alphanumerical	alphanumerical	graphical
Key of database	-	name of settlement	name of settlement
Format of database	analogue (digital)	digital	Digital
Files of database	paper, xls, sav, dBase	xls, dbase	Dwg

Table: 1: Main characteristics of the research

5.3 The findings of the survey by questionnaires

The questionnaire used for the research was made in connection with a nationwide survey. The standard sets of questions provided a great deal of valuable information, which I am planning to make use in the future. The geographic aspect, however, was neglected in the collection; it did not contain any indices suitable and identifiable for geocoding. This is one of the morals of this pilot survey. In the future, the questionnaire should be supplemented to make it suitable for GIS-based examinations, too.

Some relevant sets of questions of the questionnaire survey predominantly dealt with the dispersion / penetration of ICT devices, its usage and the quality of access (technology in the sociological level).

Another important set of questions examined the attitudes to ITC devices: computer literacy, use of online academic materials, traditional class, blended learning, forms of activities; paper-based or electronic-based (sociological level).

5.3.1 Technology aspects of the sociological level

The spread of ICT devices among the university college students has provided a surprising result. There was one PC in every family of the students questioned, and 94 per cent of the students had the PC as their personal possessions. These two data mostly match each other. It is typical in Hungary that only one PC and Internet access are bought per household. The start of the PC usage stretches back over one decade on average, which precisely coincides, on the one hand, with the mass appearance of the Internet in Europe and in Hungary, and – taking into consideration the generation questioned – with the first diagram. This generation just bought their first computer at the age of 14-15; at the end of the primary school, at the beginning of the secondary school.

Question	**Answer (%)**
Is there any PC in the family?	100
Do you have an own PC?	94
How long have you been using a PC?	For 9,5 years on average
How long have you been using the Internet?	For 5,3 on average

Table 2: The penetration and user level of ICT devices

The chart below illustrates the dispersion of the access types. ADSL technology is gradually displacing ISDN, and the number of the mobile communication is also rising, while the proportion of the households without Internet access is less than 20 per cent. It is important to note that this survey is of the college students. The national average is the inverse of that. In Hungary, there is no PC in the 68 per cent of the households, and there will have been Internet access (at most) in 16 per cent of the households by the end of the year.

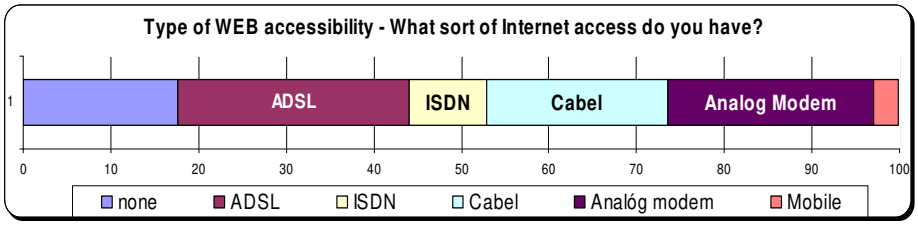

Figure 2: Type of WEB accessibility - What sort of Internet access do you have?

5.3.2 Attitude aspects at the sociological level

In the evaluation of their own PC skills good rating has been given by the students questioned (Table 3). They use PC every day; therefore the positive evaluation is entirely acceptable as realistic. The Internet and ICT in general, however, are hardly present in the teaching - learning processes. Little is the amount of such tasks given to the students during their studies that require the use of such technology, databases (e-books, e-library). In addition, teachers are not really pleased to use ICT-based teaching aids (PowerPoint slideshows, WEB sources, online presentations, videos, animations). The use of these is considered complicated, therefore clumsy and time-consuming by most of them.

Web connection, however, requires some attention. The students use the Internet, primarily, to keep in contact with each other. Consultations with the teachers are still mainly face-to-face-based (Table 3).

Digital format is already generally accepted as a form of academic work. Besides the limited use of Internet sources there still has a strong attachment, adherence to the Guttenberg Galaxy, that is, printed formats are still highly demanded.

Question	**Rating 1 to 5**
Evaluation of your own PC skills.	3,76
To what extent do you use Internet sources for your studies?	2,61
Do you need any online contact with your tutor?	4,29
Do you need any online contact with your associates / other students?	4,52

Table 3: Attitude survey - rating with 1 to 5

What is your preferred format when preparing your essay at home?		
electronic	printed	hand-written
59%	35%	6%

Table 4: Preferred formats of home essays in the examined sample

5.4 NEPTUN statistics

All the data of the students are at my disposal from the NEPTUN, the student registration system of the university college. This database is the source for analyses based on academic years, faculties, gender, etc. One of the primary keys was the name of the settlements, which could be associated with the map database. MS Excel 2003 software was used by me for the preparation and normalization of the databases. During the preparation of the data the most serious problem was caused by faulty data transfer. The particular names, settlement's names, addresses contained several minor inaccuracies. The connection with the map database, however, works only with exact (one to one) data correspondence. Redundancy did not occur here.

5.5 Graphic data

The digital map database is topologically correct, of EOV (Egységes Országos Vetületi rendszer - Standard National Projection system) coordinate system, and it is in AutoCAD DWG format. The normalization of the map database required special attention in order to avoid redundancy. AutoCAD Map 5 GIS software was used for handling maps and connecting the graphic and alphanumeric databases.

5.6 Linking databases

Initially it was needed a primary key to be defined for the connection of the databases. In this case the most suitable data for this purpose was the settlement's name. The digital maps – after appropriate graphical purification techniques – contained the names of all the settlements of the country as specific identifiers. The NEPTUN database also contains the names of the settlements, which can also be used here as specific identifiers. After the normalization and the correction of the inaccurate fields it has been suitable for connection.

The data of the questionnaire did not have an appropriate key field. Although there are maps available about the geographic dimensions of the survey, and the names of people questioned are in the NEPTUN database, the third, newly created database, however, cannot be linked to the other two. This is one of the most important experiences of the pilot survey. The questionnaires are needed to be tailored according to this requirement in the later phase of the research.

6 The geographic dispersion of the human resource

In the following points a few analytical methods will be presented, all of which deriving and presentable from the connected databases. The attributes belonging to each student were placed as points in the topologic centre of the settlement. Around this point a buffer zone was created by me, which, as a coloured spot, covers and represents the spatial object in a more effective way.

6.1 Dispersion by academic years

In the evaluation of the skills of new students arriving at the university college it is inevitable to examine the geographic aspects. For several geographic reasons the economic structure of Hungary is considerably unbalanced regarding its regions and micro regions. The reform of the political and economic system (in 1989) has even more deepened these discrepancies.

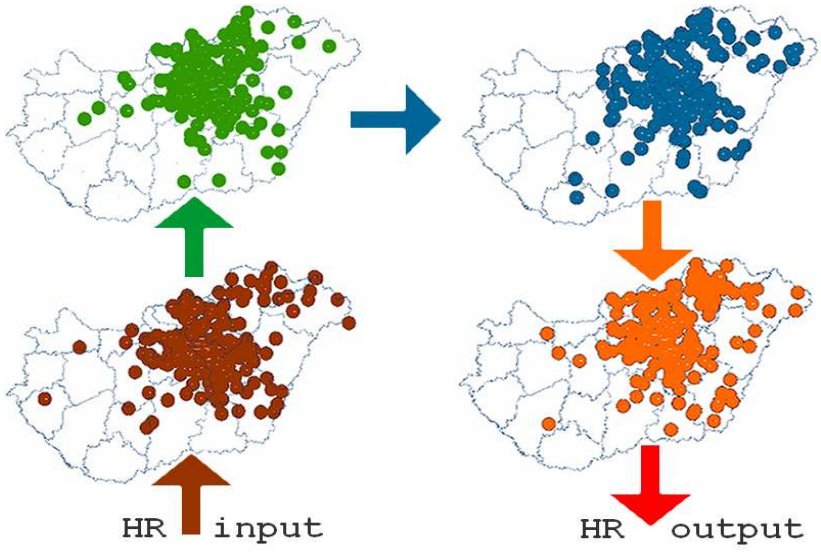

Figure 3: Student dispersion by academic years

The analysis by academic years (as illustrated in figure 3) was aimed to examine what sort of differences can be observed between regions with different economic potential (GDP) and socio-cultural traditions (at micro region level). I intend to continue this research with another extended longitudinal research examining the difference (or added extra) between the input and output, when I can entirely follow up 1-2 academic years.

6.2 Dispersion of the academic subjects

Special thematic maps have been created for each data group (e.g. by academic subjects, years, etc.). The presentation of the differences requires an overlay analysis. This can also be seen on the following chart (Figure 4).

The students of each subject are presented by academic years. The database of the students in the year selected has been attached to the chart. There is a thematic database query in progress with the use this source. The centroids are located in the centres of the settlements. The set of the contained block attributes that contains also the names of the settlements are linked to them, too. The buffer zones drawn around

the blocks make up an overlay presenting the complexity of the field intended to indicate the proportions of the subject specialization chosen.

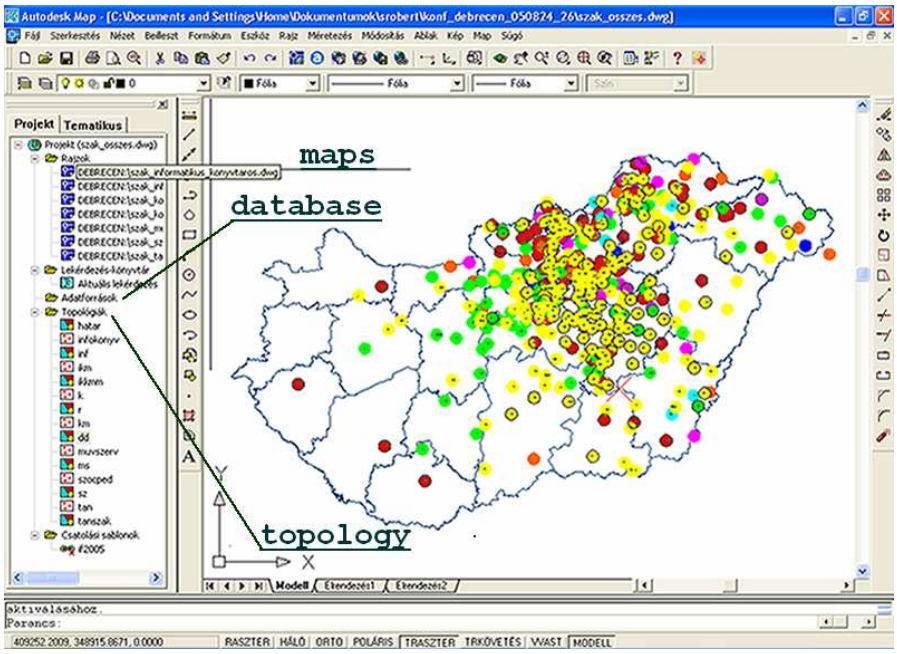

Figure 4: Geographic dispersion by subject specializations

6.3 Dispersion by gender

Our institute started functioning as a teacher training institute in 1917 (in the form of secondary education then). Teachers have been trained here at 'university college' level (equivalent to BA and BSc levels) since 1975, and the proportion of the female students is absolutely predominant. Because of this fact, a gender-based analysis is also a highlighted area of the current research.

It is important to know what the gender ratio of the students is in the university college. We would like to know what sort of spatial relationships do the female students of our institute have, and towards which occupations and universities or other schools of the higher education the male population is drifting from that micro regional area. The examination of these space flows can also provide useful information about the drifting dinamics, the orientation of the human resource.

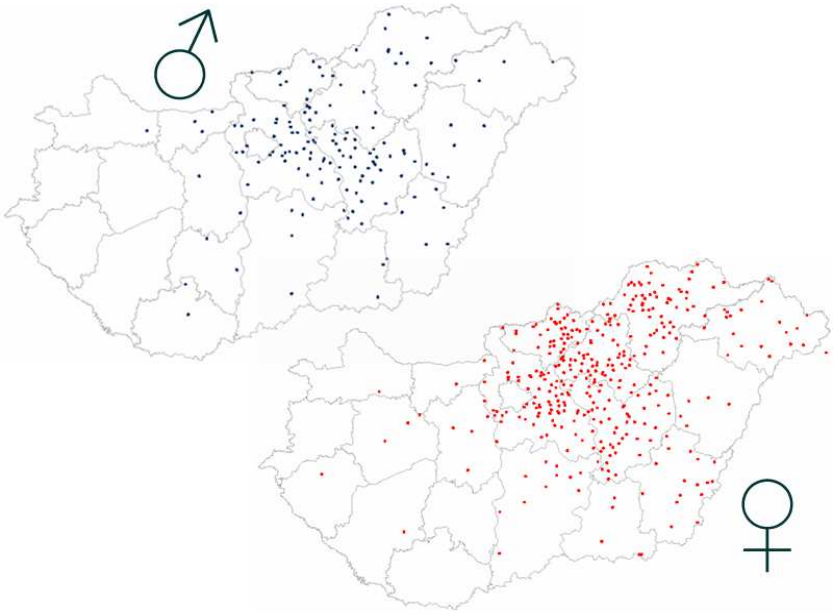

Figure 5: Geographic dispersion by genders – the proportion of women (♀) is predominant; men (♂) have a different career pattern

7 Conclusions

The current study has intended to report on such a pilot research, which was aimed to examine the human adaptation of the information society at regional level, and to prepare further work. The preparation phase of the research has been completed.

From the results obtained so far it can be clearly seen that the spreading of infocommunication technology with the support of the manufacturers does not accomplish the mission by itself. For the critical mass evolution it is vital that, besides the adequate technology, the human adaptation should be elevated to the highest possible level; that is the premise is not the technology but the knowledge / competence. To reach the critical mass the first strike is given through the education, to all of its participants (e.g. Sulinet Programme, http://www.sulinet.hu/tart/kat/Re). If their demands reach the desired level, the process will penetrate into other social segments. The first circle of the evolution spiral is complete. The success of entering into the information age depends on whether the whole society can be made educated, furthermore whether the participants will be able to absorb and handle complex information [Castells, 98].

The problem can be traced back to the lack of adaptation, to the 'human interface gap'. It is not about the central role of the knowledge and/or information, but about their spreading, application, and their impact on the knowledge-generating and information-processing communication devices. This will lead to the revaluation of the education system, therefore those countries can profit from the process that invest

the most into research development, education and IT infrastructure [Z. Karvalics, 02].

At this stage I intended to give an account of the first findings of the analyses after raising the problem. This research has not been able to project the changes of the economy and the society or to illustrate them. That will be the next step. The changes and their impact, however, can be discerned both in the education (Bologna process), and in the everyday life of our town, micro region. Researches with geographic approach, such as this, can offer a new opportunity for the comprehension of this global change.

8 Future Work

The highlighted areas of the research for the future, in order of importance, are the following:

1. Composition of a questionnaire that really meets the requirements of the research (measurability, spatiality / geographic approach, digital literacy, competence)
2. Setting up a database
3. Integration of classical geographic analyses, methods (communication geography), the role of the classical infrastructures and ICT networks, etc.
4. Syllabus development for improving digital literacy competence
5. Provision of the conditions of a longitudinal research
6. Publication of the results/findings

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