Theoretical Background and Possible Research Methodology for Investigating Gender Differences in ICT Field

Hajnalka Fényes
University of Debrecen, Department of Sociology and Social Policy, Hungary,
email: fenyesh@freemail.hu

Abstract:
The girls are in advantage in education in several fields. Girls are in majority in general high schools and in higher education, and according to our "male disadvantage hypothesis", the social mobility of girls is higher, than that of boys (boys study in high schools and in higher education with better cultural and material background). The other field - where boys may lag behind girls -, is school efficiency. Many studies show, that girls are more successful in high schools, and they have better grades in higher education. In the ICT field the situation is different, more boys study in this field, and the grades and test scores of males in this field are better than that of girls. Our aim is to investigate the possible causes of this phenomenon. In this paper we try to find the theoretical background and the possible research method to reveal this question.

1. Theoretical background

Concerning the theoretical background of gender differences in ITC field, first we will examine the role of factors affecting school efficiency (in general), the school efficiency of male and female students, gender differences of competence areas, and finally the possible causes of the greater high school efficiency of girls (in general), based on the literature.

1.1. The role of factors affecting efficiency

Educational efficiency contains the efficiency of students (not only based on the knowledge achieved in school), the effectiveness of schools and teachers, and the correlation of these two factors. There is no common consent for the measurement of educational efficiency. International examinations do not only measure the end-product but the output, as well, they compare the start and end points. The newer efficiency examinations monitor both student efficiency and teacher-student relationship and the role of school leadership. Besides, the "added value" research examines the effects of student composition of schools (classes) on the efficiency of schools, as well. (Lannert 2004)

The famous "Coleman Report" (Coleman et al. 1966) was the first to discuss what the role of within school factors is in the differences between students' performance, but according to the early results, the effect of the school in student efficiency is negligible; rather, it was the family background and the individual abilities of students to make a difference. However, according to newer PISA tests and other examinations, as well, variations of student-performance are also explained by the quality of teaching and the social composition of student groups. Therefore, the so-called contextual effects are also important. The material background (outward resources) of the school may also count, and the availability of resources within the school may be significant, as well (Alexander, McDill 1976).

In Hungary, family background has a large role in one's education and qualifications – it is the greatest among the OECD countries (Róbert 2004; Horn, Sinka 2006)

In another study of ours, we researched the contextual effects on student efficiency in a borderland region of Hungary (Fényes 2008b). According to our results, the rate of students per classes/schools who have highly educated parents affects student efficiency, and primarily the efficiency of students with not highly educated parents. Therefore, where the rate of

highly educated parents was small, the students with highly educated parents performed better, and where this rate was high, the children of not highly educated parents have better results. We also found positive contextual effects with respect to religious relationship resources of the students.[1]

1.2. School efficiency of male and female students

As long as physical power had played a dominant role in society, women had no chance for equal rights. However, the cognitive abilities of females are not worse than those of males, moreover, their school performance is better. The language learning ability and verbal skills of women exceed the similar skills of boys (Czeizel 1985), but boys have better spatial abilities, logical and counting skills and technical abilities, although these differences decrease with ageing. According to Czeizel, women do not have lower intellectual abilities; it is their social opportunities that are more limited. (Czeizel 1985)

It is important to remark that the distribution of the intelligence values of males is flatter; and the number of men with exceptional abilities or a mental handicap is higher.[2] The test results show, that there is considerable male advantage at high scores, except for reading and text comprehension, and this phenomenon is permanent in time. (At the low scores the case is inverse.) (Nowell, Hedges 1998).

In the field of basic abilities and competence, girls are improving compared to boys. The cognitive abilities of girls exceed the abilities of boys at the end of primary school, already. In the 1980's, Hungarian researcher (H. Sas 1984) already spotted that girls were able to perform better even in the field of abilities mostly preferred by boys (the international results will be presented later).

Based on American data of the 1960's, researchers have shown that women have altogether better results in high school, even if they filter out the effect of the family background, abilities, skills and the choice of preparatory course for higher education entrance exam. Girls also tend to have better educational self-concept. They only lagged behind in the field of mathematics results. (Alexander, McDill 1976)

Today, even the mathematics results of girls are better than those of boys, and in the U.S. and other developed countries we find an overall better high school performance of girls according to GPA (Grade Point Average) indexes. (Perkins et al. 2004, Clifton et al. 2008) The 1991 and 2001 data of the OECD countries also show that the elementary and high school performance of girls is better than that of the boys. Other researchers have demonstrated that, in the 1990's, tests showed a slight male advantage (and the differences hardly changed with the lapse of time (Hedges, Nowell 1995)), but with respect to grades, girls were already in the lead in the 1950's and 1960's (Buchmann, DiPrete, McDaniel 2008).

One of the efficiency indexes is the ambition of studying further in higher education. In the U.S. in 1980 the rate of further study plans was similar in case of girls and boys; however, in 1996 these rates were already divergent: 60% of girls and 49% of the boys intended to undertake further education. In addition, girls often start their further studies directly after high school, and they are also more perseverant, and finish their tertiary level studies at a higher rate. (Bae et al. 2000) According to the 2003 Hungarian results, girls were also in the lead with a 64% of them intending to study further as opposed to the 58% rate of

[1] In classes where the number of churchgoers was small, the students not going to church were more efficient. In classes where this number was high, the churchgoers were more efficient. Presumably, this is the stimulating effect of denominational schools on the efficiency of churchgoers. It is notable that the religious relationship resources of parents – churchgoing and the religious group of friends – did not affect student efficiency, either on individual or on group level.

[2] The reason for the higher rate of men with exceptional abilities can be that these tests were primarily invented by men and for men. (Czeizel 1985)

boys. It is remarkable, though, that when not accepted, girls would choose the option to retry application process at a greater rate, while boys would attempt to choose some sort of profession. Girls were also accepted in higher education at a greater rate, while many boys did not even attempt to study further (the self-selection of boys), or were not accepted. (Liskó 2003)

As we have already noted, girls today have better grades on all school levels; therefore their tertiary level efficiency is also greater (Buchmann, DiPrete, McDaniel 2008). According to certain Canadian data from 1997, there was a 7% difference for the advantage of girls in tertiary level institutions in higher education performance, but this difference was not significant. Nevertheless, girls studying in higher education proved significantly better in the fields of text comprehension, debating skills, and strategies for success. (Clifton et al. 2008)

1.3. Gender differences of competence areas

If we look at the competence areas, girls are in a lead at reading- and text comprehension according to the PISA 2000 test – both in Hungary and in the OECD countries. A slight male advantage can be detected in mathematics and sciences, but the difference is only significant in half of the OECD countries, and it decreases in time (Freeman 2004). Other data also indicate significant gender difference in reading, but not in mathematics (Marks 2008). Hungarian analyses show that girls are better at reading and text comprehension, and that there is no gender difference at mathematics (Horváth, Környei 2003). According to recent PISA studies, differences in performance on the fields of competence between girls and boys are considerably smaller in Hungary than in other countries (Keller, Mártonfi 2006).

American researchers encountered divergent results at early reading abilities according to social status. Among students with a disadvantageous background, girls had better reading abilities, but gender differences disappeared at students having better social background. (Entwisle et al. 2007) It is an interesting phenomenon to see that even according to Hungarian data, the difference between the performance of boys and girls decreases with the increase of the qualification of parents (Vári et. al. 2000).

Based on data from 19 countries from the years 1964 and 1982, we can state that gender differences decreased with the lapse of time in mathematics test results and grades, and the difference is smaller in those countries where girls are represented in higher education at a higher rate and their prospects for work are better. There are countries where even girls had better results in mathematics as early as 1982 (Finland, Hungary, the French part of Belgium and Taiwan). (Baker, Jones 1993)

Interestingly, results in mathematics do not differ by gender in the first years of studies, and gender differences appear later on (Bae et al. 2000, Freeman 2004). The background to the slightly weaker mathematical performance of the girls in 1960's and in 1970's may be that the attitude to mathematics and confidence in one's mathematical knowledge were different by gender. Women were less interested in mathematics and were less confident in their mathematical knowledge. (Catsambis 1994) Therewith, according to numerous psychological examinations, the background to the weaker mathematical performance of girls can be found in gender stereotypes, gender socialization, and not in weaker abilities and biological features (Spencer et al. 1999, Spelke 2005).

The mathematical results of our times hardly deviate from each other by gender in 6th and 12th grade, but girls are less interested in mathematics and therefore few girls choose to study mathematics and sciences in higher education. Many researchers suggest that careers on these fields of interests have to be made more attractive for girls, and it is not the problem in the results that needs solving. (Liver et al. 2002)

The divergence in the choice of courses in high schools is also important. In the 1980's, less women chose advanced level mathematics courses in the U.S. Girls only

accomplished the minimum (in mathematics and sciences) that was necessary for entering higher education. (Mickelson 1989) Nowadays, however, girls tend to choose mathematics classes at the same rate, and the choice of courses is becoming more similar at boys and girls (horizontal segregation is decreasing) (Buchmann, DiPrete, McDaniel 2008). Advanced level mathematics courses are chosen by boys and girls at the same rate, and the differences in performance rather depend on attitudes than on the choice of courses. (Bae et al. 2000, Freeman 2004)

1.4. The possible causes of the greater high school efficiency of girls

Besides knowledge, the other important feature in school is diligence, as opposed to creativity or quick wit which is mainly characteristic of boys (Rostás, Fodorné 2003). Girls are more diligent and tend to memorize more, while boys strive to find correlations between knowledge items. Considering all, we can observe that the study methods of girls are more efficient, and that they are more successful in elementary and high schools. (Rostás, Fodorné 2003) Hungarian students are on the top of the OECD country rank with respect to rote learning. Hungarian girls have a remarkable "cramming technique" which is way above the OECD average (Horváth, Környei 2003).

While there is hardly any gender difference in cognitive abilities, the grades of boys are worse, and their rate of absence is greater in school. Some think that the cause of this is found in the differences between non-cognitive abilities. Boys are less capable of paying attention in school, and find it harder to work in a group. They are less helpful, and cannot go along with homework and other school materials as efficiently as girls. This may also affect the further study plans of boys in a bad way – via their worse school results. (Jacob 2002) Boys have more problems with reading, and girls tend to have better social skills and behavior in the class. Girls also relate to studying more positively and most of their non-cognitive abilities are better. (Buchmann, DiPrete, McDaniel 2008) Besides these, girls take part in extra-curricular activities (except for athletics) more frequently (e.g. cultural activities, working at the student self-government) (Bae et al. 2000, Freeman 2004).

The greater self-discipline of the girls also leads to higher efficiency in school (Duckworth, Seligman 2006). Another reason for higher efficiency may be the fact that parents deal with their daughters (e.g. in the case of mathematical difficulties) during their studies rather than with their sons (Muller 1998).

A further reason for the better school efficiency of girls may be their will to meet the requirements, to be a good student, to accomplish what parents and teachers expect them to do (H. Sas 1984). This can originate from the differing gender role socialization. Men find it important to acquire professional knowledge[3] and other intrinsic rewards. They also have better self-confidence, but girls aim to acquire social appreciation and other external approval. (Mickelson 1989)

It is an interesting question what correlation we can find between the high rate of female teachers and the better results of girls. Girls would like to be like their female teacher; this helps their assimilation in the school and their adaptation to school life (Rostás, Fodorné 2003). Boys do not consider school life and the requirements masculine enough, and rebel against the educational system mediated by women. Nevertheless, there are opposing opinions, as well, saying that the female teacher pays more attention to the male student, and we can find the respect of the opposite sex. Researchers also argue whether boys perform better if the teacher is a man (Buchmann, DiPrete, McDaniel 2008).

[3] To acquire professional knowledge, of course can motivate boys to gain better school results, as well, but the secondary school system do not reward this aspiration as much as girls' „good student" attitude.

The cause of higher female efficiency may be the fact that girls tend to study with greater pleasure – as opposed to boys. In second grade of elementary school, boys feel that they succeed more easily, think that they are brighter than girls, tend to be more content and like going to school. Fourth graders, however, learn that discipline makes it easier to adapt to school life and girls seem to be better at this than boys. By this time, girls love going to school and learning more than boys do, and also consider themselves more diligent (Rostás, Fodorné 2003)

There is a question also, how the option for coeducational or separate education affects the efficiency of boys and girls. According to some researchers, segregated training in higher education is advantageous to girls. They reason that in the 1960's and 1970's there was a great number of famous women (physicians and researchers) graduating at female institutions in the U.S.. However, the lack of the filtering of social background and selection is the fault of this research, since these schools are predominantly attended by the daughters of high-status parents, and female students in these institutions are rather career-oriented. Thus, these two factors could be the reason for their success later in life. (Jacobs 1996) The statement that coeducational schooling would be of positive effect for male student efficiency in high schools and of negative effect for female efficiency did not gain verification, either. Coeducational schooling did not affect Mathematics and English results either in a positive or negative manner (male advantage in Mathematics and female advantage at English remained). (Smith 1996)

Another cause of the higher female efficiency may be that girls have greater cultural activity. According to DiMaggio's (1982) research, the cultural capital of girls is significantly higher than that of boys (based on the measurements used by DiMaggio). The author draws our attention to the fact that cultural interest and practice are culturally expected from girls. However, this is less characteristic of boys, moreover, it may trigger negative sanctions from their peers. Because of the career opportunities and all its inherent financial advantages monopolized by men, girls find it more important to excel on cultural-type markets. Further reason for the higher cultural capital of girls is that "women who wish to be recognized as eligible partners for man from high status background may need cultural capital to a greater extent than man who wish to achieve in the world of work" (DiMaggio 1982, 198).

Hungarian girls also display greater cultural interest than boys do; girls tend to have greater cultural consumption and read more (especially more belles-lettres – for data see also Fényes 2006, 2008a). [4] According to DiMaggio, abilities and the family background on their own have but little influence on school grades, but the cultural capital of the students may have a greater effect. Based on his results, the effect of cultural capital on non-technical subjects approximates that of the assessed abilities. According to Bourdieu (1973), students in the school are rewarded based on their cultural capital and since the girls' cultural capital (but not the parental cultural background) is significantly higher (either in high school or during the first years of higher education – see Fényes, Pusztai 2006, Fényes 2008a), this may be a reason for their greater efficiency. It is also noteworthy that, according to DiMaggio's (1982) American finding from 1960, the results of female students with parents of higher education were affected by cultural capital to a greater extent (cultural reproduction model is present here). Meanwhile, this was true for the results of male students whose parents had lower educational qualification (cultural mobility model is present here). It is important to note that DiMaggio examined the cultural resources of students and neglected the resources of parents.

[4] Girls are in the lead in „high culture" activities (reading habits, theater, museum, art movie and concert attendance), but our results showed, that boys use internet more frequently, so it can be said that the boys' cultural activity differs from that of girls', and it is not necessarily inferior. DiMaggio's results support, that in the secondary school the cultural activities, preferred by girls improve their school performance. On the other hand cultural activities, preferred by boys may enlarge their better chances on the labor market.

His results show that the positive effect of the cultural resources of students on school efficiency will still prevail even after the filtering of the effect of individual abilities and social background. Dumais (2002) also establishes that cultural capital has a positive traceable effect on the grades of girls, while this effect is weaker in the case of boys. Because of traditional gender roles, girls tend to show greater cultural activity and their success in school is more impelled by cultural capital.

2. Research methodology

Concerning the possible research methodology to examine gender differences in ICT field, we suggest regression analysis, with a help of which we can examine our research question. For building such regression models (which could be done by SPSS data analysis program), we have to define dependent and independent variables, and than we can calculate how the explanatory variables affect the dependent variable. The dependent and independent variables should be continuous or dummy variables, nominal variables could not be included in the model. We need samples at least with 1000 items per country (because the standard error should be minimal). The students have to be chosen randomly (who will fill in the questionnaire).

Before computing regression analysis we can use crosstabulation method (concerning nominal variables), compare means method (concerning continuous variables), or correlation analysis for examining gender differences, which are much easier to calculate than regression model, but we can check only the relation of 2 or 3 variables, and not the effect of several variables.

Concerning regression model, first we have to define how we measure school efficiency in ICT field. This will be our first dependent variable. We have to create a complex measurement, not only based on grades in high schools in ICT subjects, but we have to measure the test results in this field, as well. We can include further variables as participating in student competition activities, in extracurricular activities, private lessons, and study circles in ICT field. The other group of variables could be "soft" measurements, like somebody like to study ICT subjects, what kind of attitude he or she possessing concerning ICT learning. The complex variable of ICT achievement in school (based on variables, we have already mentioned) could be created by principal component method or factor analysis (by SPSS program).

The second step after creating the dependent variable in regression models is to define the explanatory variables. The first variable – of course - is gender (sex), but in sociological perspective we have to control the effect of the social background of students, as well. The question is, is there any gender difference in ICT performance, after controlling the social background of students. Our previous results (in Hungary) show, that the social background of boys is better in high schools (their social mobility is smaller), so the greater school efficiency in ICT field of boys could be a result of their better social background. We have to test this hypothesis. So our further explanatory variables are concerned with the social background of students. It can be measured by the material background of students (for example possession of durable consumer goods of students' family during the studies, the subjective material background variables for example: "standard of living better than 10 years before" or "possible financial problems", the number of siblings, which can affect the material background as well). The second group of explanatory variables refer to the cultural background of students (the education of parents (measured by the number of years completed in education), reading habits of parents (whether the parents read, the number of their books is above average), the cultural consumption (theater, museum, art movie and concert attendance), or the objective cultural capital (the possession of encyclopedias, dictionaries, books in a foreign language, books an art, classical music records, paintings per students and

their parents). The students' place of residence can also affect the efficiency. These variables should be included in the model, and in the questionnaire.

The contextual variables can also affect success in ICT field, for example the social composition of class (the rate of parents with intellectual profession, or the rate of boys in the class). These effects could be measured with multilevel models, which are normally not compatible with SPSS program.

The other dependent variable could be the further – higher education - study plans in ICT field. Here again we can measure gender differences, after controlling the social background. Hypothesis of these two models (with different dependent variables) could be that boys are in the lead in ICT performance and further study plans in ICT field, even if we control their better social background in high schools.

The occupation of parents could be also interesting. We can examine the parental background concerning what kind of profession the parents have. An important question could be whether is the profession is atypical by gender, or is the profession related to ICT field or not. We suppose that gender atypical profession of mother or occupation of parents in ICT field affects students' ICT performance and career choices.

It is an interesting question, why the boys or girls choose ICT field in vocational schools and in their further (higher education) study plans. What kind of motivation can be in the case of different genders? Why the girls choose such further studies in a lower percentage, than boys? Concerning this question we can ask, why the student wanted to study in high school (the motivations could be: he/she like studying, the family or friends motivated him/her, the prestige of the institution etc.). The other question could be what kind of motivations are existing concerning further – higher education -studies in ICT field (better job opportunities, better salaries in ICT field, better high school performance in mathematics and ICT field, special interest in this field, family tradition, vocation, the friends choices etc.). These motivations can be varied by gender, and this can affect career choices and performance in ICT field.

We can ask in the questionnaire, as well if the student worked during the studies, in which field, and we can measure the attitude to work (i. e. what is relevant concerning the work based on students' opinion). These above variables can affect career choices and ICT performance. We can ask questions about students' religiosity and the scale of values of student, as well which can also affect school efficiency and career choices.

We can examine gender-role models in family, and students' attitudes to gender roles. This could also affect success in ICT field, and career choices. We can explore the students' gender role attitudes by the agreement of such kind of sentences: "domestic work is a women's task", or "the father should be involved in bringing up children" etc. Another question could be what is more important in life: family and private life, or the work and the career. We can ask, as well if the student want to have children and if yes, how many. We can ask other questions about gender stereotypes and about gender socialization of student, as well.

Finally beside social background, motivations and attitudes of student, we can ask: what is the student's opinion about coeducational or separate education, especially in the field of ICT. We can ask further questions about the students' opinion about the feminization of teacher profession.

3. Summary

Although there are still areas where girls are in disadvantage, (even in education, e.g. due to the horizontal and vertical segregation), we can state that there is an overall girl advantage in education. As we could see, girls are in majority in secondary and higher education, and in former studies of ours (Fényes, Pusztai 2006, Fényes 2008a) the male disadvantage

hypothesis was supported. This hypothesis suggested that the social mobility of boys is smaller and their attempt on studying further in general high schools and in higher education is based on their better material and cultural background.

Besides the rates in education and the social mobility, there is another area where girls are in advantage, and it is school efficiency. At first, we studied the background of efficiency examinations. We dealt with the role of factors affecting efficiency, the divergent efficiency of boys and girls, the differences of competence areas, and finally with the possible reasons for greater female efficiency in secondary level education. We found – based on the special literature - the reason for this in the success of the studying methods of girls, their better non-cognitive abilities, their greater self-discipline, their willingness to meet all demands (acknowledgement of others is more important for them), the greater pleasure they find in studying and finally their greater cultural activity (girls read more, and their cultural consumption is bigger).

Concerning the research method of examining gender differences in ICT field we suggested regression analysis. The dependent variable of the model could be student's performance in ICT field (we have to create a complex measurement), or the further higher education study plans in ICT field. We can build two separate models. The explanatory variables could be similar in the two models, beside sex we can examine the effect of the social background of students, family tradition concerning jobs in ICT field, gender role models in family, students' gender role attitudes, motivations of studying in high school, motivations of further studies, students' religiosity, the scale of values of student and the students' attitude to work. Further questions - which are to be included in the questionnaire, and later to be examined - the students' opinion about gender stereotypes, the feminization of teacher profession and about coeducational or separate education in ITC field.

Works cited

Alexander, K. L., McDill, E. (1976): Selection and Allocation Within Schools: Some Causes and Consequences of Curriculum Placement. *American Sociological Review* 41(6):963-980

Bae, Y., Choy, S., Geddes, C., Sable, J., Snyder,T. (2000): *Trends in Educational Equity of Girls and Woman*. Washington, D.C. : Natl. Cent. Educ. Stat.

Baker, D. P., Jones, D. P. (1993): Creating Gender Equality: Cross-National Gender Stratification and Mathematical Performance. *Sociology of Education* 66(2):91-103

Bourdieu, P. (1973): Cultural Reproduction and Social Reproduction In: Brown, R. (ed.): *Knowledge, Education and Cultural Change*. London Willner Brothers Limited, p. 71-105

Buchmann, C., DiPrete, T. A., McDaniel, A. (2008): Gender Inequalities in Education. *Annual Review of Sociology* 34: 319-337.

Catsambis, S. (1994): The Path to Math: Gender and Racial-Ethnic Differences in Mathematics Participation from Middle School to High School. *Sociology of Education*, Vol. 67. No. 3. 199-215.

Clifton, R.A., Perry, R.P., Roberts, L. W., Peter, T. (2008): Gender, Psychosocial Dispositions and the Academic Achievement of College Students. *Res. High. Educ*. 49:684-703

Coleman, J. S., Campbell, E. Q., Hobson, C. J., McPartland, J., Mood, A. M., Weinfeld, F. D., York, R. L. (1966): *Equality of Educational Opportunity*. Washington, D.C.: United States Government Printing Office

Czeizel, E. (1985): A nők biológiai „természete" és társadalmi lehetőségei. [The Biological "Nature" and Social Possibilities of Women] In: Koncz Katalin (szerk.) (ed.): *Nők és*

férfiak. Hiedelmek, tények. [Women and Men. Beliefs and Facts] Magyar Nők Országos Tanácsa, Kossuth Könyvkiadó, Budapest, 21-50.

DiMaggio, P. (1982): Cultural Capital and School Success: The Impact of Status Culture Participation on the Grades of U.S. High School Students, *American Sociological Review* Vol. 47 April p.189-201

Duckworth, A. L., Seligman, M. E. P. (2006): Self-Discipline Gives Girls the Edge: Gender in Self-Discipline, Grades, and Achievement Test Scores. *Journal of Educational Psychology* Vol. 98 (1): 198-208

Dumais, S. A. (2002): Cultural Capital, Gender, and School Success: The Role of Habitus. *Sociology of Education.* Vol. 75 (January): 44-68

Entwisle, D. R., Alexander, K. L., Olson, L. S. (2007): Early Schooling: The Handicap of Being Poor and Male. *Sociology of Education* Vol. 80 (2): 114-138

Fényes, H. (2006): Férfiak és nők az érettségi utáni képzésben határon innen és túl. [Men and Women in Training after High School Graduation in Hungary and Beyond the Border] In: Juhász Erika (szerk.) (ed.): *Régió és oktatás. A „Regionális Egyetem" kutatás zárókonferenciájának tanulmánykötete*. [Region and Education. The Study Volume of the Closing Conference of 'Regional University" Research] Debrecen, Doktoranduszok Kiss Árpád Közhasznú Egyesülete 115-128.

Fényes, H. (2008a): Boys and Girls within Denominational, Respectively Non-denominational High-schools in a Borderland Region. In: Pusztai, Gabriella (ed.): *Religion and Values is Education in Central and Eastern Europe*. CHERD, University of Debrecen p. 97-114.

Fényes, H. (2008b): Contextual Effects on Student Efficiency at Secondary School Students. *Review of Sociology* Vol. 14. No. 2. 33-62.

Fényes, H., Pusztai, G. (2006): Férfiak hátránya a felsőoktatásban egy regionális minta tükrében. [The Disadvantage of Men in Higher Education in the Reflection of a Regional Sample] *Szociológiai Szemle* (16)/1. 40-59.

Freeman, C. E. (2004): *Trends in Educational Equity of Girls and Woman 2004* National Center for Education Statistics U.S. Department of Education

Hedges, L. V., Nowell, A. (1995): Sex Differences in Mental Test Scores, Variability, and Numbers of High-Scoring Individuals. *Science* 269 (5220):41-45

Horn, D., Sinka, E. (2006): A közoktatás minősége és eredményessége. [The Quality and Efficiency of Public Education] In: *Jelentés a magyar közoktatásról* [Report on Hungarian Public Education]
http://www.oki.hu/oldal.php?tipus=cikk&kod=Jelentes2006-18_eredményesség

Horváth, Zs., Környei, L. (2003): A közoktatás minősége és eredményessége. [The Quality and Efficiency of Public Education.] In: *Jelentés a magyar közoktatásról* [Report on Hungarian Public Education]
http://www.oki.hu/oldal.php?tipus=cikk&kod=Jelentes2003-minoseg

H. Sas, J. (1984): *Nőies nők és férfias férfiak. A nőkkel és férfiakkal kapcsolatos sztereotípiák élete, eredete és szocializációja*. [Feminine Women and Masculine Men. The Life, Origin and Socialization of Stereotypes related to Women and Men.] Akadémiai Kiadó, Budapest.

Jacob, B. A. (2002): Where the Boys aren't: Non-cognitive Skills, Returns to School and the Gender Gap in Higher Education. *Econ. Educ. Rev.* 21: 589-598

Jacobs, J. A. (1996): Gender Inequality and Higher Education. *Annual Review of Sociology*, vol. 22, p. 153-185.

Keller, J., Mártonfi, Gy. (2006): Oktatási egyenlőtlenségek és speciális igények. [Educational Inequalities and Special Needs] In: *Jelentés a magyar közoktatásról* [Report on Hungarian Public Education]

http://www.oki.hu/oldal.php?tipus=cikk&kod=Jelentes2006-19_egyenloseg

Lannert, J. (2004): Hatékonyság, eredményesség és méltányosság. [Effectiveness, Efficiency and Equity] *Új Pedagógiai Szemle* 2004/12. http://www.oki.hu/oldal.php?tipus=cikk&kod=minoseg-lannert-hatekonysag

Linver, M. R., Davis-Kean, P., Eccles, J. E. (2002): *Influences of Gender on Academic Achievement*. Presented at the biennial meeting of the Society for Research on Adolescence, New Orleans, LA.

Liskó, I. (2003): Továbbtanulási ambíciók és esélyek. [Ambitions and Chances for Further Studies] *Educatio,* (12)/2. 222-235.

Marks, G. N. (2008): Accounting for the Gender Gap in Reading and Mathematics: Evidence from 31 Countries. *Oxford Review of Education* Vol. 34 (1) February p. 89-109

Mickelson, R. A. (1989): Why Does Jane Read and Write so Well? The Anomaly of Woman's Achievement. *Sociology of Education* Vol. 62 (January): 47-63.

Muller, C. (1998): Gender Differences in Parental Involvement and Adolescents' Mathematics Achievement. *Sociology of Education* Vol. 71 (October):336-356

Nowell, A., Hedges, L.V. (1998): Trends in Gender Differences in Academic Achievement from 1960 to 1994: an Analysis of Differences in Mean, Variance and Extreme Scores. *Sex Roles* 39(1-2):21-43

Perkins, R., Kleiner, B., Roey, S., Brown, J. (2004): *The High School Transcript Study: A Decade of Change in Curricula and Achievement, 1990-2000*. Washington, DC: Natl. Cent. Educ. Stat,

Róbert P. (2004): Iskolai teljesítmény és társadalmi háttér nemzetközi összehasonlításban. [International Comparison of School Achievement and Social Background] In: Kolosi Tamás, Tóth István György, Vukovich György (szerk.): *Társadalmi Riport 2004.* TÁRKI, Budapest 193-205.

Rostás, R., Fodorné Bajor, B. (2003): „…könnyebb a lányoknak, mert a fiúk elevennek születtek". [...It is Easier for Girls since Boys were born more Lively.] *Új Pedagógiai Szemle* 2003/December http://www.oki.hu/oldal.php?tipus=cikk&kod=2003-12-mu-Tobbek-Konnyebb

Smith, I. D. (1996): *Gender Differentiation: Gender Differences in Academic Achievement and Self Concept in Coeducational and Single-Sex Schools*. Australian Research Council Institutional Grants Scheme Final Report (http://alex.edfac.usyd.edu.au/Localresource/study1/coed.html)

Spelke, E. S. (2005): Sex Differences in Intrinsic Aptitude for Mathematics and Science? A Critical Review. *American Psychologist* Vol. 60 (9): 950-958

Spencer, S. J., Steele, C. M., Quinn, D. M. (1999): Stereotype Treat and Women's Math Performance. *Journal of Experimental Social Psychology* 35(1):4-28

Vári, P., Bánfi, I., Felvégi, E., Krolopp, J., Rózsa, Cs., Szalay, B. (2000): A tanulók tudásának változása II. rész. [The Changes in the Knowledge of Students. Part 2.] *Új Pedagógiai Szemle*, 2000/7-8. http://epa.oszk.hu/00000/00035/00040/2000-07-ta-Tobbek-Tanulok.html