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Track: Challenges for the future

## ***Girls, science and society. Between necessity and stereotypes***

### ***Why girls don't want to study maths and want to study pedagogies?***

This article is based on the results of the first part of research which has taken place in the school year 2008/2009 with girls at a few secondary schools in the north-eastern region of Poland. The subtitle of this paper is a kind of metaphor question about the Polish educational system. The north-eastern part of Poland is a specific region. The main source of income for the people in this area for a long time has been agriculture.

The reason why this mini-project occurred is the situation concerned with gender equality in Polish higher education. It shouldn't be found as very concise, especially in science at technical universities. Every year we waste a lot of talented girls, who start to study humanities or social sciences in spite of their very good grades in mathematics and physics during their whole cycle of studies in secondary school and also at their final exams. So it's interesting to observe if and how changes in girls' attitudes to science and to study disciplines that are commonly perceived as masculine. Are there any negative attitudes if so are they ones that hold value? It's important to answer these questions: What do girls think about science? Why do they think this way (and in this case what can we do to change it?) How to promote and accelerate changes in girls' minds and to encourage them to study at technical universities? There is one more reason to find answers for the above mentioned questions. Presented research occurred as a response to the needs of the informal gender group called Kofe(m)ina, which has been initiated by the Author of this paper.

The main research method is a focus group concentrating on non-standardised interviews connected with visual methods - the use of photographs at the first stage and individual non-standardised quantitative interviews at the second stage of research. In this article only the main results of the first stage are presented.

For the basis of my research I'm going to analyse some current statistics and reports of previous quantitative research carried out on this issue.

Pure transcripts of group interviews with girls at the end of lyceum, which in fact used to be a kind of talks with girls about their attitudes to studying science and humanities, are also a background for the second part of research – individual interviews, which are going to be completed

in October 2009.

### **Brief view of the situation in Polish education**

Since Polish educational reforms in 1999 our educational system consists of three stages:

- children from the age of 7 to 13 attend a 6-years primary school
- then they continue at a 3-years obligatory gymnasium this ends with a state exam
- then they can choose between:

- a) 3-years lyceum (general or specialized) which ends with a final exam,
- b) 4-years technical school (technikum) which also ends with one final exam or
- c) 2-3 year's vocational school which prepares students for work in different occupations.

Education is obligatory in Poland from the age of 7 to 18 years old. Usually students finish their education being 19-20 years old. From 2004 one year preschool is also obligatory for 6-years old children. Recently discussed was a proposal to change the age of school beginners to 6. Schools in Poland can be public (administered by local governments, free of charge) or private and paid. Both kinds of schools are supported by the Polish government.

The present organization of higher education is based on the law on higher education of July 27th, 2005. The higher education system comprises of both public and non-public institutions.

Graduates of first level courses (studia pierwszego stopnia) are awarded the professional title of licencjat or inżynier (or equivalent) after 3-4 years' study. Graduates of the second level courses (studia drugiego stopnia) are awarded the professional title of magister or equivalent after 1.5 to 2 year complementary magister level courses. There are also uniform 5-year magister level courses (jednolite studia magisterskie).

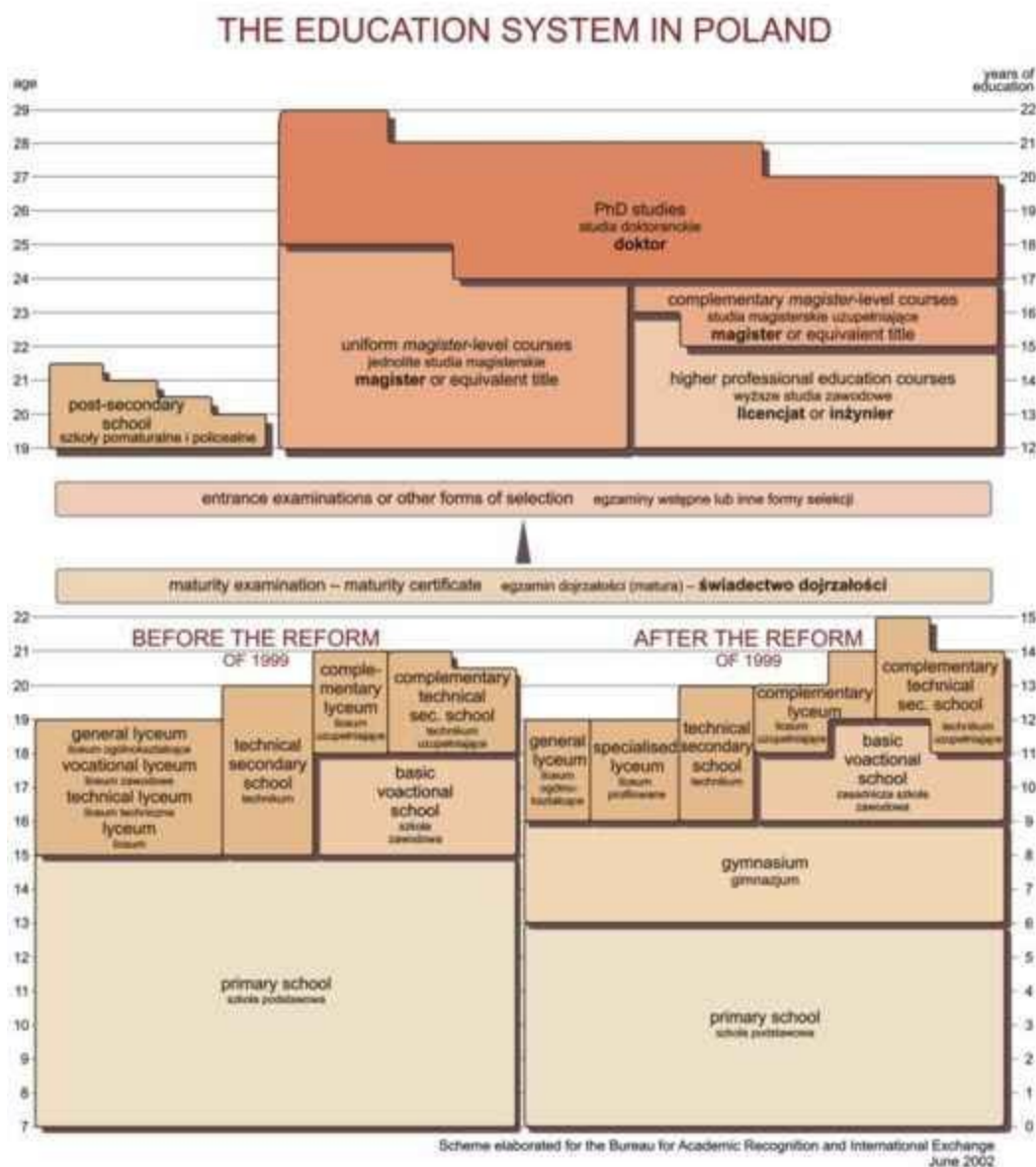
### **Why girls don't want to study maths and want to study pedagogies? Analysis of the example research reports**

Before starting the research project many previous research reports were analyzed. As examples only four of them are presented below.

The first one is GAPP (Gender Awareness Participation Process) reports from 2007 about differences in the choices of science careers. It was a European project which involved the Warsaw University (available in English on line at <http://www.gendergapp.eu/UserFiles/File/GAPP-IDI-report-PL.pdf>). At this website [www.gendergapp.eu](http://www.gendergapp.eu) there are also European GAPP reports and national reports from

all involved countries.

The second is „Blind to gender – education of equal chances in Poland” (2008) concerning gender issues in whole Polish education system (available in Polish at [http://www.feminoteka.pl/downloads/raport\\_www.pdf](http://www.feminoteka.pl/downloads/raport_www.pdf)).



Source: [http://www.virtualcampuses.eu/images/thumb/8/87/Education\\_system\\_in\\_Poland.jpg](http://www.virtualcampuses.eu/images/thumb/8/87/Education_system_in_Poland.jpg)

Next are two WiST (Women in Science and Technology) European reports from 2006 and 2009 about the “leaky pipeline” mechanism which causes womens exclusion from careers in science and technology fields (available at [http://ec.europa.eu/research/science-society/pdf/wist\\_report\\_final\\_en.pdf](http://ec.europa.eu/research/science-society/pdf/wist_report_final_en.pdf) and also at [http://ec.europa.eu/research/science-society/document\\_library/pdf\\_06/wist2\\_sustainable-careers-report\\_en.pdf](http://ec.europa.eu/research/science-society/document_library/pdf_06/wist2_sustainable-careers-report_en.pdf)). And the last example is ENWISE (Enlarge Women in Science to East Expert Group)

this is a report on “wasting the talents” in post-communist countries from 2003 (available in English at [http://ec.europa.eu/research/science-society/women/enwise/pdf/enwise-report\\_3.pdf](http://ec.europa.eu/research/science-society/women/enwise/pdf/enwise-report_3.pdf)). Because the education system influences the situation on the labour market, there were chosen reports from different areas – from lower stages of education through higher education through to the work environment.

### **Gendered education**

On the basis of research reports it's clear that educational paths of girls and boys start to differ in the secondary school. More girls attend the lyceum and technical schools are considered as alternative for boys. At the lyceum in “humanistic”, “biological”, “arts” classes are mostly girls and the “physical” or general classes usually consist of half to half girls and boys or a majority of boys. Then higher education is also gendered – girls often choose social or humanistic studies at universities or medical academies and boys more often choose technical universities. But nowadays in Poland more women than men have diplomas from high school. 65,9% of HE graduates are women. 41,6% of PhD graduates are women (data from 2001).

Considering the ENWISE report one can see that there are 38% of women among researchers in Poland (data from 2001). In Polish higher education it is a visible horizontal segregation. We have about 34% of female researchers in Natural Sciences, only 16% in Engineering and Technology, 43% in Medical Sciences, 33% in Agricultural Sciences, 38% in Social Sciences and 33% in Humanities.

At Polish universities women constitute a third of all academic staff, but they are typically illustrative also of vertical segregation, even though the statistics show that women have the best chance of promotion in Poland of all the Enwise countries. Polish women constitute approximately 33% of academic staff and tend to be concentrated in the lower academic positions. In Poland, only 16% of full professors and 22% of associate professors are women; however, 31% of the academic staff with a Habilitation and 39% with a PhD are women (both full-time and part-time positions are included).

The main conclusions are:

- not many girls choose an education in science,
- we waste a lot of talented girls at the end of secondary school,
- we need the girls to be involved in science; this is the potential, the capital to use to develop our region, country and Europe,
- science education gives better chances in the labour market.

The Polish education system fails somewhere at lower stages of education. The results can be observed in higher education:

- we do not have as many female researchers as we need,
- women are concentrated mainly in humanities and social sciences and at the lower positions of academia; they usually can't make decisions at its organizational level.

Analyzed reports are huge European and National projects. Presented in this papers mini-project you're given the data about a specific area of Poland and how it is relevant to local purposes and local practice. Results of this research would be compared to those noted wider projects. North-eastern part of Poland is characteristically an area with a high rate of unemployment. It's very important to direct youths from such regions to the streams of education which could lead them to privileged positions in the labour market. In Poland it's much easier to find a job for an engineer and any kind of engineer earns a lot more money than for example a teacher. It's rather obvious what it's worth doing, but girls still choose more common and lower paid jobs.

### **Girls' point of view Situation at the end of secondary school, plans for the future**

The first phase of presented research took place in March 2009. Eight focus groups interviews using the photographs were conducted in three different schools in two cities – Olsztyn (200 000 inhabitants) and Kętrzyn (30 000 inhabitants). This is the qualitative research method. The target group is not very wide. The most important thing is the significance of studying science and humanities in girls' minds.

At the beginning, to start the conversation, some photographs of female and male roles were presented. Girls were asked about what they associated to these pictures. Then different questions were posted. Here could be presented only the most significant questions for this paper. However it's highly related to the future of girls attitudes, so should be focused on questions about studies they choose. It is possible to observe a few characteristic traits among these attitudes.

In each area there were three components:

- perception and knowledge
- behavioural
- emotional

Table 1. Questions scheme

Time	Areas								
	Education (A)			Female and male roles in society (B)			Work (C)		
Past	P	B	E	P	B	E	P	B	E
Present	P	B	E	P	B	E	P	B	E
Future	P	B	E	P	B	E	P	B	E

In this paper would be presented only a few examples of very common declarations among girls, which occurred during our talks, concerning mainly their choices about higher education.

**R: Which occupations seem to be attractive to you? Who or what would you like to be in the future?**

- *The doctor.*
- *The doctor...*
- *The doctor, like the majority of us, but the most attractive work is the position of a chairperson, who is able to master a team, and thanks to this she can achieve independence... maybe to demonstrate independence of men. Usually the position of chairman is intended to male.*
- *This is the stereotype that man should be more dominant in business...*
- *And while woman is in the same position... she highlights great independence.*

[Biology-chemistry class]

The doctor usually seems to be good work for woman. However girls noticed that the best thing to do is being a chairperson, they personally don't have this kind of aspirations.

- *We can't say that there's nothing like discrimination in some work places and occupations.*
- *Of course.*

**R: In which occupations?**

- *For example manager or chairman. A female is treated like someone, who is able to achieve less, which is more emotional even... maybe... And male chairman, he has... well he's a boss, like a strong person, someone the most important in a firm. And women are sometimes treated worse.*
- *Especially by males.*
- *They are able to exploit that the female is a chairperson. And use this to their advantage.*
- *For example if there works is scientific, females' scientific findings are much more sceptically investigated than males' works. It could be said that females are simply dominated by emotions and*

*they can't keep an objective view.*

- *Well, women having these feelings are precise, more likely to find the truth. Men, when they get to know some facts, don't check if it's true, because they are not influenced by feelings in their approach to scientific issues.*

[Biology-chemistry class]

Girls are aware of discrimination in some areas of social life. The male position is usually privileged and it's easier to achieve and hold it. In Polish there is no word like “chairwoman” in fact. Girls were using masculine language form, which is something like “female chairman”.

***R: Why nowadays in biology-chemistry classes are there more girls?***

- *Well, maybe because females don't give in to stereotypes. They don't feel like doing something concrete and don't do things they like to do.*
- *Maybe their ambitions are bigger.*
- *By now it just came out... Well, simply...*
- *No, it's not like that.*
- *Boys are too lazy to learn biology.*
- *Because learning biology is...*
- *If someone doesn't know biology, they won't know it in the future also...*

[Biology-chemistry class]

Girls are better at biology, because it's hard and boring work to learn. And boys like to feel comfortable and are too lazy to work as hard. Girls are assessed and assess themselves in the wrong way as “being stereotypes resistant”.

***R: Would it influence their [boys] future? What/How do you think? Which faculties will they choose? Which opportunities?***

- *Yes. It would be hard to start any kind of studies. And you would have to learn, studying. Nowadays when you don't have an education, it would be hard to get a good job.*
- *And surely they are going to choose easier faculties...*

***R: What does it mean?***

- *Well, those which don't require too much devotion. For example...*
- *In my opinion boys choose the faculty, which they would be able to understand and wouldn't be forced to learn by heart...*

- *Yes, yes. More rational approach than...*

**R: And which faculties are these?**

- *Environment protection.*
- *Like the Technical University. Some science faculties.*

[Humanistic class]

There often occurs a sentence “boys are lazy” and they “won't work hard”. In girls minds that's why they choose science and technical universities – because boys understand everything and girls have to/prefer learning by heart. Girls think this is a true, not a stereotype. They declare, they know it from experience.

**R: It is a rather small group of girls. Boys are the majority. Why is this so?**

- *I don't know.*
- *In humanistic class it is only one boy and all the rest are girls.*
- *I think it's not that boys are better in mathematics and girls in humanities. Maybe boys feel rather forced to learn science. and rather in humanities girls have a better predispositions. I don't know exactly... It is established in society.*

[Computer technology-mathematical class]

Only a few of them see the problem in social construction. Only a few of them try to behave like they want, independently of stereotypes.

**R: Has there been anyone who suggested which occupation is worth choosing?**

- *Yes. Parents.*
- *A doctor is the best or a dentist.*
- *O, doctor also. By me too.*
- *Well, also... Oh, “you would be the one and only doctor in our family”. But I don't want to... No, no...*
- *It can't be. You want to do it or you don't want. It comes by itself. Suddenly you find something, what... you read some opinions about a particular university or faculty and ... you know what it is. But you know that you want to do it and it matches.*
- *Something that gives you satisfaction from work and you feel good about it. It makes no sense when someone is trying to tell you what you should do and why... Well, I don't know...*



- *That you have to.*
- *That I have to.*

[Humanistic class]

Often parents are the ones who try to suggest what is worth doing, but girls often do what they think to be good for them. Of course parents usually suggest that the best work is to be a doctor. In Poland it's a well paid job, but at the same time girls are aware of the responsibility for human life.

***R: Why is it worth being a doctor?***

- *Money...*
- *Because of money.*
- *Well paid.*

***R: Is it easy to tell if it's typically females or typically male's work?***

- *No.*
- *Rather not.*

***R: Why don't you want to be a doctor?***

- *Too much responsibility. And too much learning.*
- *It's necessary to have a passion. Latin terms, hundred thousands of medicines, different compositions, I don't know... diseases, descriptions, diagnosis. It's much more learning than at a building faculty.*

[Computer technology-mathematical class]

***R: Do you feel that science is a man's field?***

- *No.*

***R: Are there any duties a woman should do?***

- *In males' minds there surely are [laughs]... House work. Though it's going to change now. But there are also people... I don't know... traditionalists, who for example think that a woman should stay at home.*

***R: And what do you think?***

- *She shouldn't! [many people]*
- *Woman should do, what she likes. She likes for example house work, so she should stay at home. And*

*if she wants to work, if she thinks she can do it. She should do it...*

- *I think women should always do what they want.*

**R: Do you always do what you want?**

- *It means that, for example, I do what I want and I wouldn't let anyone set me any limits.*

**R: Who for example?**

- *Well, I don't know... Future husband, man, boyfriend... But it should be obvious too, that sometimes we can make a compromise.*
- *It's not necessary to be such an individualist and not pay attention to others needs... When someone thinks similar, he gives us also some... advantages?*

**R: You've just told me that when a woman wants to, she can stay at home and be a home maker, if she feels satisfied about it. Which of you would like to stay at home?**

- [laugh]

**R: Nobody? So, what would you like to do?**

- *To be financially independent.*

**R: Is it important?**

- *Yes.*

**R: Why is it so important?**

- *Not to be dependent on someone.*
- *To be independent...*

[Computer technology-mathematical class]

When talking about women's duties, girls usually react very emotionally to such questions. They declare that a girl should do what she wants to. And they are always sure, that their decisions are independent. They do not see any social determined factors.

**R: Are there any things woman shouldn't do?**

- *I don't think so.*
- *When she wants to go a certain way... when she wants to do something, she should do it whether it is appropriate or not to her gender... She can be a plumber, a doctor; she can be also a nanny or a teacher, anything she wants to be.*

[Humanistic class]

**R: Who does it affect?**

- *Well, it's taken over. This is... don't know... socially inherited. It's unconscious, but it's heard – such common opinions... or... our day-to-day life. We inherit, nobody knows when.*

**R: Do you feel in some way exceptional, because you are in such a science-class and you are in a minority?**

- *We are all exceptional (laugh) and so on... but... well, it's true.*

**R: It's not typical for girls, is it so?**

- *Well, yes. But through this break off we've got more chances in our future lives. Because, for example, in humanities there is much more competition. Well, and sometimes it's worth thinking about rather than to simply choose a favourite subject, or... or... something exactly compatible to your predispositions. It's better to learn more now and to suffer than later be unemployed.*

[Computer technology-mathematical class]

And social construction again. But to be honest, it's an exception if they see it.

**R: Are you going to study at universities or technical universities?**

- *Universities.*
- *Me – technical university.*
- *Me too.*

**R: Only two at technical university? Why?**

- *Because at the technical university it's rather science... IT... physics... associated...*
- *Not everywhere.*
- *Not everywhere.*
- *(...)*
- *But it's easier to start to attend that kind of studies.*
- *Fewer candidates.*
- *Well, that's good. Only to start... That's it. When you have attended... you have to make efforts to stay in... To start is the most important thing. And that's it. Then you can use even you claws to stay there and not to get put out.*
- *Technical university seems to be a man's world. It's masculine...*
- *Is it bad?*
- *But technical university is rather masculine.*

***R: Is it why you avoid it?***

- *No.*
- *Maybe not.*
- *No, rather not.*
- *For me it's a plus for example. It's better to work with men. With women it's harder to come to an understanding. Oh, yes, that's it...*
- *Yes.*
- *Yes, that's true.*
- *Men are not so quarrelsome.*
- *They have different ways of solving problems. It's easier for them.*

***R: Why did you choose technical university?***

- *I think it could be interesting. I'm interested in it. Faculty of management and engineering production, so it's versatile, interesting. Wide perspectives for sure...*

[Computer technology-mathematical class]

Talking about studying at Technical Schools, the first thing girls notice is that Technical Schools are “masculine” - there are only men and the social atmosphere is specific. And the next moment they say that it's not a cause for avoiding Technical Schools by girls. But in fact they avoid it (!).

Only one girl in this group was trying to force her opinion, that it's better to study at Technical School and it's better also to work with men. But other girls have said that's not true, but the thoughts in their heads seem to be really strong and it affects girls' behaviours and choices.

### **Summary & conclusions**

Emotional aspects: What do girls feel about studying different disciplines and about female chances in different streams of higher education? What are their personal opinions?

They are oriented against stereotypes, labelling and the exclusion of women from some important areas of social life.

The perception and knowledge: What do they know about studying different disciplines?

Girls know a lot about it and they see many examples of discrimination around them, especially in the labour market, but it's a kind of common knowledge and they still have “gender schemes” deeply in their minds. They easily associate some disciplines to masculinity and other to femininity.

They identify themselves with “female” disciplines and jobs. They don't see that social construction limits their aspirations.

Behavioural aspects: What do they really do? What kind of studies do they choose?

They choose most likely humanities, social sciences (especially education) and medicine. These choices are made even sooner – at the end of gymnasium, when choosing the profile for a class in lyceum.

There is a visible gap between oral declarations and real choices.

What's the most important? Even if they are in “science” classes at school, they often want to choose pedagogies (which are associated with females' studies and jobs) or they want to study maths at the university (not technical university) to teach then maths at school. In my opinion the educational system should give girls the academic knowledge about the social constructs of gender. And they should also know how to use this knowledge in their lives.

### **Trends for the future – predictions**

If the situation in Polish education won't get change, we can't count on changes in girls' attitudes. In Poland we don't have any gender educational programmes. It depends only on the teacher's practice what shape would have gender education in class. There are some useful websites with teaching materials for gender equal teaching (<http://www.wstronedziewczat.org.pl>), but most teachers are hardly aware of gender equality ideas and gender mainstreaming. They don't use such materials and usually don't know about such websites. It makes our contemporary education „gender blind”, full of stereotypes and it's has not changed till now. The most important problem is that gender issues are invisible to decision making bodies. And gender research is still not treated really seriously at Polish universities (there are only a few exceptions).

As it was said in the National Women's Law Centre's report, *When Girls Don't Graduate, We All Fail: A Call to Improve High School Graduation Rates for Girls*, programs that have been successful in recruiting and retaining students in classes that are non-traditional for their gender share a number of common characteristics (source: *How to Promote Gender Equity in Career and Technical Education: A Primer for Schools*, National Women's Law Centre, 2007, available at <http://www.nwlc.org/pdf/Final%20CTE%20Fact%20Sheet.pdf>).

To replicate successful strategies and increase the likelihood that girls will learn science among other steps the school may initiate:

- ✓ Effectively identify and build strong education-community partnerships, interagency coalitions and business partnerships – not present in Polish schools;
- ✓ Introduce students to role models, including professionals who have non-traditional careers and peers who participate in non-traditional education sectors – not present in Polish schools;
- ✓ Build upon or cultivate an institutional commitment to gender equity and compliance with civil rights laws and use the program as an opportunity to train all staff about gender equity – in Polish schools most teachers are females, what does not apply is their empowerment in this sphere (research of L. Kopciewicz, 2007);
- ✓ Respond to the needs of the local labour market by featuring high-demand occupations – weak element of Polish educational system;
- ✓ Expand model programs to other under-served populations that historically have not participated in careers that are non-traditional for their race, disability or socioeconomic status; and
- ✓ Develop and regularly update a comprehensive equity plan to identify and address discriminatory practices and artificial barriers to girls' enrolment and completion of non-traditional programs, such as steering by counsellors, differential treatment by teachers, and sexual harassment from peers, and take necessary steps to remedy any problems that may exist.

And (last by not least) – to be improved there has to be some programmes first! In Polish education there is a strong need to create and initiate some gender education programmes at schools.

### **How we can accelerate changes – suggestions**

What could we do about it? Would it be a good practice to work in organizations like Kofe(m)ina and to start the cooperation with some schools? In Kofe(m)ina some important issues are now discussed. It's going to become a formal nongovernmental organization. Members of Kofe(m)ina undertook some research (as presented in this paper) and plan to start “the mission” at schools in north-eastern Poland. At the beginning an informal group Kofe(m)ina plans to make:

- Theatre workshops in gymnasium and lyceum
- Thematic workshops at primary, secondary schools and gymnasiums
- WenDo workshops,

- And many other actions proposed by Kofe(m)ina members.

We hope it won't be "mission impossible"...

The final effect of presented research should be an educational programme with an aim to make girls aware of their real abilities. The programme would be used by Kofe(m)ina in informal early actions to build up girl's positions in higher education.

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