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"Boys' mind, girls' heart": Barriers to the realization of the potential in gifted girls – Responding to challenges

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in future. As literature mentioned above indicated that self-doubt in gifted girls was associated with a decrease in educational and occupational aspirations, such beliefs might function as a

lead to a change in confidence in one's ability and can have devastating effects. As mentioned above, poor self-confidence can further lead to lowering aspirations and changing professional plans. Researchers also identified various factors that might be beneficial in supporting gifted girls to overcome these barriers: providing mentors and positive (female) role models, intervention programs focused on specific needs of gifted girls, and offering possibilities to them to test their capacities in a supportive environment.

Taking all previous considerations into account, the following implications for interventions and research can be identified.

Adolescence could be viewed as an appropriate (or, even, critical!) period for providing support, encouragement and (possibly) counseling services to gifted girls, as overwhelming "open issues" and unresolved problems that occur in teenage period could follow some of gifted girls throughout their life path, or even progress. The latter assessment has been consistent with research findings that the conflicts and barriers become more apparent as gifted girls mature and face decisions at critical junctures in their lives. In fact, the intersection of these factors (ability, age, career choice, and personal decisions relating to marriage and children) may result in additional internal barriers (Reis, 2002). Consequently, it might be suitable to:

a) Organize well-designed extra-curricular programs that would address specific needs of gifted girls and provide challenging learning opportunities tsuut(1.876 (fem)1uut.7(ls)10.examte)8.p

wishes, and that girls have been bombarded with unrealistic and superficial images that put pressure on them to be physically attractive (Hanson, 1995; Heller & Ziegler, 1996; Randall, 1997; Reis, 1998; 2001). One relevant study (Noble, 1989) summarized interpersonal obstacles in the following manner: rejection by family, teachers, and peer groups; growing up in impaired families; and underestimation of abilities by families, while among socio-cultural barriers, "double messages" were notified, i.e., those which "posit inconsistent and mutually exclusive expectations for gifted individuals and for women". "Double messages" received by gifted girls have been somewhat differently described in other studies: to strive for excellence - but not to stand out too much; to do their best - as long as their best isn't better than everyone else's best; to excel in school - but not to enter careers that are traditionally male (Bell, 1989; Callahan, Cunningham, & Plucker, 1994). In addition to "double messages", authors also noted difficulties to reconcile messages gifted girls receive from different environments (home, school and society as a whole). Some authors also mentioned that religious background and religious training, received in childhood and adolescence might be associated with confusion and concerns whether pursuing one's talents should be considered "selfish" and contradictory to religious beliefs (Reis, 2002).

Influence of school and teachers: Teachers may send encouraging but also discouraging messages to gifted girls, through a variety of behaviors (including non-verbal ones), such as amount of attention given to students of different sexes, attribution of their successes either to ability or effort, willingness and skill to recognize talent/gift and respond to students' needs, etc. A few illustrations of research studies will be provided in order to reveal how teachers might become "mediators" of stereotypes. One study implied that teachers judged both gifted girls and boys to be gifted in stereotypical areas. Boys were judged gifted in physical, technical, and in strategic areas; girls were judged gifted in artistic and in social/emotional areas (Gagne, 1993). In particular, teachers' expectations and attitudes towards girls' achievement might have a profound impact in subjects like math and science. Girls talented for math and science thus could be confronted with stereotypic perceptions of their ability or internalize lower expectations of teachers. Evidence on stereotypic teachers' beliefs regarding attribution of success in math was found in some studies (e.g., Fennema, 1990); i.e., teachers attributed success of their most capable male students more often to ability, and less often to effort, while the pattern was reverse for attribution of success of the most capable girls. Further, other studies indicated that boys dominated classroom communication, including the number of times teachers call on them and the amount of time they talk, whereas "high achieving girls receive the least attention" (Callahan, Cunningham, & Plucker, 1994). Another study, however, implied interesting differences across gender in perception of teachers' attention - boys perceived inequities in the classroom to a greater extent than did girls. Gifted boys reported that the assertive, academic behaviors of boys received more attention of the teacher, while gifted girls perceived no difference in attention given by the teacher (Feldhusen and Willard-Holt, 1993). Content analyses of school text-books from gend

teenage girls to face and cope with barriers to their achievement that have been identified in the literature. They noted several factors that had favorable influence in a process of overcoming these barriers. In particular, the modeling of discussion, debate, and decision-making, mothers as female role models, and early encouragement of independent problem-solving behaviors led to greater effectiveness in compensating for these barriers. Some authors emphasized that mothers had a particular influence on their gifted daughters, e.g., talented girls with career-oriented mothers tended to develop a variety of talents and interests early in life and felt less conflict about growing up and becoming independent, autonomous women (Reis, 1998). On the other hand, it was also reported that relevant attributes found in older talented women, such as

"Beating the odds" - extra-curricular science education programs

In a view of the previously-described findings, my experience (in the period 1990-2002) in addressing needs of gifted girls might be summarized as follows — how I as practitioner (creator of programs for gifted students and counselor of gifted girls) attempted to deny predictions, which I made as a researcher (and predictions of other researchers). Overview of studies on external and internal barriers clearly indicate a necessity to support some gifted girls to overcome, for instance, a feeling of deep self-doubt and to develop their talents, in spite of obstacles they face in the immediate surrounding (e.g., parental underestimation of their abilities, hostility of the peer group, etc). In other words, how to help some gifted girls (who are faced with difficulties) — to "beat the odds" and struggle against "self-fulfilling prophecies" mentioned above?

Support to gifted girls was provided within the model of advanced extra-curricular science education of the gifted, developed in Petnica Research Center, the first alternative educational center (outside of the regular school system and independent of educational authorities) in the former Yugoslavia. The Center organized educational programs, primarily for high school students, but also for university students, and teachers, as well as research studies in different scientific disciplines. It is worth notifying that the Center was initiated more than 20 years ago by a group of young experts and students who were not familiar with theoretical conceptions of giftedness (although the model developed in the Center have had certain resemblances with Renzulli's conception of giftedness). Even, the policy of the Center implied avoidance of the very term "gifted" in official contacts with schools and during implementation of the programs; expressions like "highly interested for additional learning" or "highly motivated for science" were used instead. Such policy was based on a belief that labeling students as gifted might impose on them adults' expectations and plans (which could differ from students' own expectations and plans).

Several aspects of the programs proved to be beneficial for providing supportive, but also challenging environment for development of gifted girls.

Beliefs about "giftedness" and selection procedures: Contacts with a majority of high schools at the national level were established, so students from all parts of the country (almost the entire high-school age group) had a possibility to apply. Consequently, programs were highly selective; the number of candidates/applicants was 3 to 10 times larger than the number of attendants (depending on a particular program they applied for). Selection criteria emphasized the importance of motivation, highly-developed interests and creativity, rather

shift paradigms in gifted education from "mystery" model to "mastery" model of giftedness has been present in the recent literature, e.g., Matthews and Foster, 2006).

Organization and underlying principles: Extra-curricular science education programs for gender-mixed groups of students were provided (free-of-charge) in various scientific disciplines — mostly, natural sciences, math, computer science and electronic engineering, but also several fields of social science. Programs were implemented in annual "cycles", consisting of 4-5 mutually-dependent courses, which involved complex content and topics that were not covered in regular curricula (mostly, the content was far beyond knowledge of regular high school students). Students spent app. 30 days per year in the Center; thus, their contacts with school-mates and peer groups (and socio-emotional development) were not obstructed, and a possibil

successful former students were invited (upon entering the university) to become so-called younger associates, i.e., to participate in educating subsequent "generations" of students, as mentors. This specific form of mentorship proved to have extremely favorable outcomes – these young mentors invested a lot of effort in providing individualized training and support to (slightly) younger students-colleagues; their commitment, patience and motivation was enormous, and often exceeded those of adult mentors. Involvement of younger mentors was, possibly, the most appealing aspect of these programs for the gifted, and contributed to internal dynamics and programs' attractiveness. Further, the mentorship system was "self-generating", as new mentors were appointed each year, while old ones, upon graduation, continued to visit the Centre as guest-lecturers or part-time research associates.

Girl-friendly environment and its outcomes: Throughout the programs, a special attention was paid to needs of gifted girls, particularly those who experienced difficulties in the family, a lack of understanding and support in their immediate surrounding, or those who encountered numerous other problems, due to low socio-economic status of the family. Further, as mentioned above, most programs were organized in natural sciences and similar disciplines, so girls involved in these programs were often confronted with the conflict between their interests and stereotypic perceptions of their families and peers. Informal discussions about their problems and counseling services were provided; girls were particularly encouraged to gain or maintain confidence in their abilities and keep their educational/professional aspirations.

Outcomes could be described as encouraging.

In the period 1990-2002, girls made up roughly 50% of program participants (the percentage ranged from 47 to 52). This proportion of girls could be partially attributed to selection criteria (with all other conditions equal, girls were slightly favored in selection procedures for e.g., computer science, physics and electronic engineering, whereas boys had a

My research related to gifted students (Brankovic, 1995-2002)² solved some dilemmas, but led to many other, new dilemmas. Only a sketchy illustration of some research findings will be notified here (more detailed description will be provided during the presentation).

Case studies of gifted girls, focused on non-cognitive factors linked with educational and professional aspirations revealed that some girls had not coped well with external and internal barriers notified above. However, it was found that many of them maintained their plans and dreams, and demonstrated an enormous courage and strength, even when faced with extremely difficult problems in the family, emotional abuse or different consequences of poor social status.

Some other research findings (based on quantitative methods),

be mediated by non-cognitive factors. However, conclusive findings could be obtained only through a longitudinal study.

Further, male and female students who attended advanced-level/second-year courses

specific instructions and detailed guidelines to teachers how to integrate gender equality perspective into school practice, e.g. suggestions how to organize workshops and exercises for children on gender equality, and to develop a gender-sensitive approach to teaching during regular school classes on different school subjects, or extra-curricular activities (using interactive teaching techniques, developed within the model of active learning; Ivic et al., 1997). External evaluation (Jankovic, 2005) of the project and the manual, based on a variety of indicators and follow-up analyses of application of the manual in practice, revealed extremely favorable outcomes of the program (more detailed information on this will be provided during the presentation). Further, external evaluation, and analyses of two independent reviewers implied that the manual was well-designed, attractive, useful, inspiring for further implementation and highly applicable in the school practice. Other evaluation analyses (Brankovic, 2005; Brankovic and Ignjatovic, 2005) indicated e.g., that almost all teachers who

involvement in curriculum planning (integrating gender-related topics into programs for different school subjects), monitoring educational policy at all levels (primary, secondary and university education), monitoring practical work of educational institutions and developing mechanisms for alleviating gender discrimination in educational practice, creating gender-sensitive teaching methods and developing manuals and guidelines for teachers, monitoring the portrayal of women in media, etc.

Analyzing curricula and school text-books for elementary and high schools from gender equality perspective, and providing clear guidelines/recommendations to future authors of text-books (i.e., introducing a "brand" – "gender-sensitive text-book"). The latter assumes that educational authorities should adopt the guidelines as mandatory for authors of school text-books, and assure that guidelines are implemented in practice

Introducing gender equality issues and issues related to barriers to realization of potential in gifted girls into curricula at the Teaching Faculty and/or other college/university programs for future teachers

Introducing gender awareness seminars as integral part of in-service teachers' training (preferably, supplemented with manuals that will provide concrete examples how to implement gender-sensitive approach to teaching in regular classroom)

Organizing similar programs for policy makers (members of relevant ministries, parliamentarians, members of bodies responsible for developing curricula and text-books), as well as media representatives

Analyzing the policy of donors in under-developed countries from perspective of gender equality

Supporting programs of women's NGOs, which are focused on teachers as target group (e.g., programs on prevention of gender-based violence and other gender-related issues)

Assuring that university programs on gender studies are created (or maintained) as integral part of university education system

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Applying models of identification of the gifted that will take into account interests, independent creative products (artistic, scientific, etc.), essays on aspirations, self-reported engagement in extra-curricular activities (i.e., models that would rely on self-descriptive techniques, and use IQ scores and personality measures only as additional indicators)

Organizing centers for the extra-curricular education of gifted students (with professional staff previously trained to address specific needs of gifted girls) and/or organizing other sporadic extra-curricular programs, e.g., activities focused on encouragement of gifted girls to conduct self-selected small-scale independent research studies, or artistic projects

Considering a possibility for affirmative action measures related to participation of girls in programs for the gifted (particularly, in science and math); encouraging participation of girls in all different forms of extra-curricular activities

Organizing specially designed courses aimed at developing leadership skills in gifted girls

Developing mentorship programs for girls who are identified as gifted in high school, including mentorship based on peer education model (appointing mentors who are only a few years older than gifted girls)

Organizing programs for parents that would enable them to identify and encourage girls' interests/needs and question their own stereotypes related to gender roles

Organizing round tables and/or discussions in regular schools, aimed at providing female role models (e.g., inviting women who succeeded in achieving their own professional and personal goals to facilitate such round tables in schools, and enabling girls to discuss their dilemmas about career aspirations and choices with them)

Providing distance-learning opportunities for gifted girls; supporting electronic journals aimed at popularization of science and art among young people (that would publish articles on thought-provoking topics beyond school curricula); encouraging establishment of Websites for exchange of experiences between eminent women and young girls

Providing career counseling at high school age

Offering counseling opportunities to gifted girls in regular schools, organizing self-support groups for them

Conducting research on culturally-specific barriers to the realization of one's

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