

# SOCIAL CAPITAL AND PRESTIGE OF PROFESSIONAL EDUCATION

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## GENDER ANALYSIS OF PROFESSIONAL POTENTIAL OF FUTURE ENGINEERS

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**Abstract.** The article is relevant as it raises the issue of the importance of attracting women to science, technology, engineering and mathematics (STEM).

The main goal of the research is to identify the gender asymmetry in professional socialization of future engineers in the educational field. Gender asymmetry in professional roles starts with choosing a training program for preschoolers, a learning profile at school, and later a professional training program. The success of professional socialization among women engineers is less connected with the specific character of the professional field of engineering, than with the preservation of gender-role stereotypes.

The resource approach used in the sociology of young adults became the methodological basis of the study. The authors conducted a comparative analysis of the professional potential of future engineers, as the volume of various personal opportunities, in three aspects: they evaluated the motivation of the realized choice of the educational institution, revealed the perception of the status of the profession they are trained in and evaluated the students' plans for the near future. Along with the temporal direction of the analysis, a comparative analysis of the professional potential of girls studying at different levels of STEM-programs (bachelors and masters) was conducted. Such a “vertical” aspect of the analysis allowed us to fix the

increase in “gender resilience” and girls' confidence in their choice of engineering career.

To identify the gender features of the process of professional socialization among students of engineering programs, the research group conducted a number of field studies in the period of 2014-2018:

- 1) the semi-formalized interviews with applicants who had chosen engineering training programs;
- 2) the survey among the students of Bachelor and Master’s degree programs in the STEM areas of training after their entering the university;
- 3) the secondary analysis of materials of the seventh stage of sociological monitoring among the students of the Ural region.

The analysis of the interview materials showed that women’s choice of an engineering profession begins at the stage of choosing a specific physical and mathematical direction of schooling. Training in such specialized classes increases the confidence of girls in their ability to master a laborious engineering program. Moreover, the successful completion of the STEM educational program adjusts the professional plans of graduates. The confidence in their own abilities and opportunity to master complex engineering educational programs grows; the decision to self-develop in engineering field strengthens.

Our analysis showed that the influence of gender stereotypes is the most pronounced at “entrance” to the educational field and on “exit” from this professional field, when students assess the prospects and problems of their future employment, professional plans and expectations.

**Keywords:** engineering education, professional socialization, gender, women, professional potential

## **Introduction**

The practice of involving women in engineering is becoming an international trend. The quantitative growth of female STEM specialists is less important than creating conditions for increasing and realizing their resource potential, overcoming structural barriers on their way to professional development and career progression in engineering.

Professional engineering culture is considered to be "masculine." At the same time, the field for engineering activities is changing today. As long as countries are joining the global information network, there is a great opportunity to embed gender equality principles in the foundations of these developing industries (Tandon N., 2012: 2-9). Preserving and supporting stereotypes about the existence of purely "male" industries today is not only unjustified, but also wasteful. There is growing evidence of the relationship between gender equality on the one hand and the economic, social and

environmental sustainability of the society on the other. Gender diversity fills the shortage of personnel, talents, skills, it is beneficial for the economy and society on the whole. At the same time, in such areas of vocational training as information security, computer science and computer technologies, which are demanded by modern economy, the number of male students is several times higher than the number of female students (Education, 2014: 368-369). Gender stereotypes, parental expectations and lower girls' confidence in their knowledge have a certain impact. As a result, by the time of entering the university, the proportion of women who want to study technical specialties is reduced. Even in cases where women study engineering by their own choice, the likelihood that they will work in this specialty is lower than for men, although there are no gender differences between their performance (Khasbulatova O. A, 2016: 3-15).

Though regretting about low representation of women in engineering professions, a number of scientists note that women have achieved parity in the number of bachelors. Gender inequality is manifested only in engineering, in engineering sciences (E. Zamyatnina, 2017: 163-176). To solve this problem, it is important to have an early vocational guidance, adjustment for a career in science, extension of mathematics courses, high-school physics, the development of a program aimed at encouraging girls to choose science, technology, mathematics and at participation of girls in technical creativity.

#### **Purpose and objectives of the study**

The goal of our research is to identify gender asymmetry in professional socialization of future engineers in the educational space of the university. The gender disbalance in technical specialties is already observed at the stage of entering vocational schools. Even in cases here women study engineering by their own choice, the likelihood that they will work in this specialty is lower than for men. However, in the field of vocational education, gender asymmetry is less pronounced than in the labor market. The field of vocational education is the only area where the "rules of the game" are clearly defined and there is a rigid system of knowledge assessment. At the same time, assessment in education depends neither on gender nor age, but only on the level of knowledge, that leaves little room for speculation and discrimination (Hotkina Z.A., 2014).

Successful implementation of the resource potential of future women engineers, and formation of professional role identity determines the behavioral perseverance, "gender resilience" of women in engineering. The lack of this confidence in women reduces the likelihood of working in engineering specialties and moving up the career ladder (Cech E. 2015: 56-77).

## **Methodology and methods**

The methodological basis of the study was the resource approach used in the sociology of young people. The authors conducted a comparative analysis of the professional potential of future engineers, as the volume of various personal opportunities, in three aspects: they evaluated the motivation of the educational institution's choice already realized, revealed assessments of the potential currently being implemented and potential as future opportunities revealed in the students' professional and life plans. Along with the temporal direction of the analysis, a comparative assessment of the professional potential of girls studying at two levels of STEM-programs, bachelors and masters was carried out. Such a "vertical" aspect of the analysis allowed us to reveal the growth of the level of "gender resilience", girls' confidence in their choice of engineering professions.

## **Results**

1. A comparative assessment of resource characteristics of professional potential among female and male students revealed a number of common features. The motive of choosing an educational institution, rather than a profession, dominates in the structure of preferences among both girls and boys, the presence of abilities is often not taken into account when choosing educational programs. Interviews with applicants who applied for technical specialties revealed an interesting fact: the majority of respondents (49% of men and 58% of women) rate their professional choice as situational. It is not an engineering profession that is chosen, but the labor-intensive, qualitative basic education, obtained in a technical college, which allows in the future carrying out an accelerated vocational retraining quite easily. There is a certain gap in the students' focus on the profession and their willingness to further work in the specialty they trained in (Reproduction, 2015: 95-96).

2. The assessment of the resource security of bachelors of engineering training programs in the gender aspect revealed the only type of inequality between boys and girls– they have got different quality level of general education at the time of entering the university, measured by the grades got at the unified state exam. Against the background of the general low (mediocre) level of pre-university training among students in technical areas of study, the number of girls with a high average school certificate is twice bigger (Bannikoba L. N. at al, 2017: 715-716).

3. The analysis of the gender structure by the type of pre-university training revealed only a decrease in the proportion of men graduated from specialized classes, gymnasiums and colleges. At the same time, the proportion of graduates from specialized classes and gymnasiums among the female students, studying in the engineering profile, has increased over

the past four years. The choice of the “masculine” profession for girls begins at the stage of choosing a specific physical and mathematical direction in school. Training in such specialized classes increases girls' confidence in the ability to master the labor-intensive engineering training program and forms “gender resilience” in engineering. Moreover, successful training in the educational program in the STEM-areas of training makes adjustments to the professional plans of girls-bachelors. The confidence in their own abilities and opportunities to master labor-intensive engineering educational programs grows. The proportion of men among the bachelors of the STEM-programs in the Ural Federal University is twice higher than women, but among masters, this ratio changes in favor of women. The number of male students in Master’s STEM programs is one third higher than have female students (Kemmet E.V. at a, 2016: 541-549). Women estimate training in engineering master program as an additional chance for employment, the opportunity to realize their abilities in practical engineering work.

4. A comparative assessment of the actualization of personal abilities did not reveal significant gender differences in the perception of professional values, in the degree of expression of gender identity among bachelors of engineering programs. Utilitarian attitude to the future profession, the desire to make a career, to realize potential in future work dominate in the list of the developed professional values of both men and women. Along with this, women estimate the value of interesting nature of future work higher than men (the indicators are twice as high). There were no significant differences in male and female assessments of the image of engineering profession. Future engineers, both men and women, evaluate lower than students of other educational programs the prestige of the future profession, its opportunities for self-realization, but at the same time are confident in its relevance and ability to ensure a decent existence (Bannikoba L.N. 2017: 719-720).

5. The potential as future opportunities is revealed in the professional and life plans of students of engineering educational programs. The significant gender differences appear at the projective “entry” into the professional field. The lack of job tenure, practical work experience worry female students to a greater extent than male students, although all of them have lack in practical experience almost equally. The low level of salary is a concern for all respondents, but for women these fears are more pronounced. Among the resources for assessing social success prevail two types of resources both for men and women: personal qualities (own intellect, abilities and business acumen) contacts and acquaintanceship. Moreover, in the latter case, it is not so much about family and kinship

support, but rather about gaining contacts and connections in the professional and business environment. Girls estimate the significance of such resources slightly higher than men.

### **Discussion**

The effect of social and cultural stereotypes admitting the possibilities of self-realization on the basis of sex is weakened in the social field of education. Gender differences in assessing the potential of students implemented in the educational field are insignificant. The influence of stereotypes is most pronounced at “entrance” into the educational field and on “exit” from this field, when assessing the prospects and problems of future employment, professional plans and expectations.

Successful mastering of an engineering education program increases the “gender resilience” of future female engineers. Their model of social success is self-assertion, response to challenges and overcoming self-doubt. Models of economic success that dominate in modern society provoke frustration among men in achieving their ideal. The continuing gender asymmetry in professional socialization brings problems to both sexes.

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