

The Role of Students' Personality Characteristics in the Implementation of Scientific Research

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Abstract

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The contribution of students' cognitive features and motivation to ensuring their research achievements is sufficiently defined but the role of their subjective representations and personality characteristics is not studied enough. The study posed the questions: are there distinctions in students' attitudes toward different stages of a research work; what personality traits and values lead to preferences or underestimation of certain stages of a research? Questionnaire for students with seven 10-point scales for the assessment of different stages of research, The Big Five Personality Test (5PFQ), Rokeach Value Survey (RVS), mathematical methods (descriptive analysis, Kendall correlation coefficient, and Mann–Whitney U test) were applied to evaluate the study objectives. The sample consisted of 75 4th year students of St. Petersburg State University (mean age 22.9±1.3). The study revealed the ambivalent attitude of students to the stages of scientific work involves planning of tasks, problem statement and selection of methods and techniques, and also influence of students' personality features on preference for certain types of scientific activity. There were found multiple correlations between students' personality traits (persistence, curiosity, emotional stability, and sensitivity), students' values (knowledge, creativity, tolerance, productivity) and their attitudes toward research activity.

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1. Introduction

Students' research is an essential part of modern university education, but the fulfillment of research is one of the significant problems for students (Doygun & Gulec, 2012), related to their low readiness

to engage in research and insufficient representations of its content. This study is the continuation of the series of our investigations devoted to studying the implementation of research potential of the person during the learning at the University (Kostromina et al., 2014). Why do we study personal features of students involved in scientific work during learning and preparing for future professional work?

Firstly, students' involvement in scientific search and experimenting is one of main conditions of better quality of modern professional training and realization of students' personal potential. Secondly, while conducting a research the personality organizes its own activity and adapts its own individual features to specific tasks because of what the research activity of the student acquires peculiar quality characteristics. Thirdly, it is seen from the study of personal features of great scientists that the ability to research is determined largely by personality and its values, not only the intellect.

Psychologically, student's research activity:

- is a type of active cognitive and intellectual creativity of students (experimental or theoretical),
- directed to searching and obtaining new knowledge,
- conducted according to logic and basic stages of scientific study,
- and performed as a qualifying work in accordance with accepted requirements.

For a long time research achievements of students were associated with certain abilities. But as do we know it is important not only to be able to research, but also to have the desire to conduct the research and be able to organize and direct its own activity. Thus, in general, there are motivational, cognitive, and behavioral features, which can be required and used for solving the research tasks and can be defined as *The Research Potential of students*. Students' research potential develops in their research activities and demonstrates itself in solving of various types of scientific problems (Kostromina et al., 2014).

There are three components, leading to the success of students' research (Fig. 1).

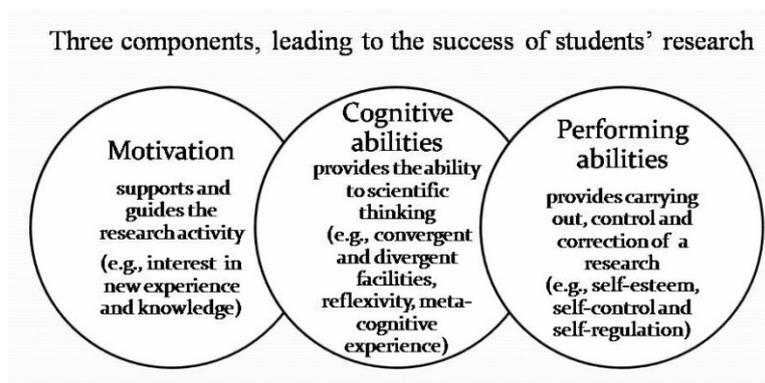


Fig.1. Components of research potential of students

Motivational component starts, supports, and guides the research activity; it includes different motives, for example, interest in new experience and knowledge; pleasure of the research process; need for self-development; desire for recognition and so on. Cognitive component provides the ability to

scientific thinking (for example, convergent and divergent facilities, reflexivity, meta-cognitive experience, intellect and creative abilities, in particular, the sensitivity to the contradictions, the originality of thinking, the ability to ask questions, to make hypotheses, intolerant attitude to the uncertainty, scientific reasoning abilities, etc). Performing/behavioral component is a system of self-esteem, self-control and self-regulation which provides a personality control of research, evaluation of results and correction of further studies.

2. Problem statement

Many studies have been devoted to the identification of the factors leading to the success of the students' research; on the base of a review of many investigations it was defined a substantial contribution of students' cognitive features and motivation (Sedaghat et al., 2011). But equally important are the personal characteristics of students ensuring achievement of the required results at every stage of research.

The personal features of outstanding scientists has been studied, and a number of their personal traits were identified, for example, skepticism and criticism, ego-strength, emotional stability, dominance, restraint (Cattell, 1963); autonomy, personal flexibility and openness to experience; the need for originality and novelty; aesthetic sensitivity (Mansfield & Busse, 1981); receptivity, independence, flexibility, confidence (Olah, 1987).

Continuing these classic studies modern authors have also confirmed the important role of students' personality that affects the executing of a research. It was found with Big Five Personality Traits that students with higher scores on openness to experience and conscientiousness scales are more likely to engage into the research activities during learning process, and the opposite effect was observed with high score by extraversion scale (Salguaira, 2012). The need to search for information is positively correlated with extraversion and conscientiousness, and negatively correlated with neuroticism (Halder, Roy, & Chakraborty, 2010). It was shown that knowledge, skills and psychological properties of students are combined in different configurations at different stages of research - the initial stage of gathering information, examination of information, its clarifying, systematization and the final stage (Karunanayake & Nagata, 2008).

Whereas the data of influence of students' personal characteristics on conducting a research have been accumulated, students' subjective representations of research activity and students' attitudes and attractiveness for them of research stages were often remained outside the studies.

3. Research questions

Analysis of the problem let us to put the research questions:

Are there distinctions between students' attitudes toward different stages of a research work?

What personality traits and values lead to preference or underestimation of certain stages of a research?

4. Purpose of the study

The purpose of our study was to explore students' representations and attitudes toward different stages of a research work, and to reveal interrelations between students' attitudes toward research stages and their personal traits and values.

5. Research methods

The sample consisted of 75 students of the fourth year of study of St. Petersburg State University, Philosophy Faculty (mean age 22.9 ± 1.3 ; 48 women /27 men).

For exploring the students' representations and attitudes we used the questionnaire, with further content analysis of data, and seven ten-point scales for the students' assessment of the different stages of a research work.

For studying students' personality characteristics we used The Big Five Personality Test (5PFQ form by Heijiro Tsuji). For studying students' values we applied Rokeach Value Survey (RVS), with ranking of eighteen terminal and eighteen instrumental values. Data was processed with SPSS-20. Descriptive analysis, Kendall tau rank correlation coefficient, and Mann–Whitney U test were applied to evaluate the study objectives.

6. Findings

6.1. Students' attitudes toward different stages of a research work

To study students' representations and attitudes toward a research work we asked them to assess attractiveness of each stage on 10-point scales, and to note the typical emotions that they are experiencing at the different stages of a research work, in free form.

Table 1. Students' assessment of the attractiveness of the different stages of a research (on 10-point scales)

Stage of research	Mean \pm SD
Reflection (awareness and analysis of process)	7.30 \pm 1.96
Data Analysis (description, comparison, etc)	7.12 \pm 2.35
Data Collection (or conducting an experiment)	6.70 \pm 2.58
Orientation (definition of the scientific field)	6.32 \pm 2.28
Problem statement (identifying of research problem)	6.03 \pm 2.41
Planning (determining the sequence of tasks)	5.52 \pm 2.09
Determination of methods (justification of methods and sampling)	4.85 \pm 2.01

The stage "Reflection - awareness and analysis of the process and the results of own research activity, the reasons for success / failure of the study, comparison of findings and hypotheses" was

estimated as the most attractive one (mean score 7.30 ± 1.96). Students associated it previously with positive emotion: content analysis showed satisfaction and pleasure (in sum 69.7%), curiosity (16.7%), and excitement (10.2 %), in percent of the number of emotions at each stage.

The stage "Data Analysis - description, synthesis, comparison, interpretation of data" got also high assessment (7.12 ± 2.35). However, this stage causes the most ambivalent emotions: the prevailing emotions were interest (34.2%) inspiration (21.1%), and concentration (13.2%); but students mentioned also tension (21.1%), satisfaction (5.3%), and boredom (2.5%).

The stage "Data Collection - collection of empirical data, or conducting an experiment; initial systematization of the data" was estimated a bit lower (6.70 ± 2.58), and was associated with the largest number of emotions, both positive ones - excitement (40.8%), interest, curiosity (27,3%), enthusiasm (11.4%) and negative ones - tension, stress (9.1%), and boredom (9,1 %).

The stage "Orientation - the definition of the scientific field for the study" received middle assessment (6.32 ± 2.28); the prevailing emotions were positive - interest (41. %), inspiration (23.1%), enthusiasm (15.38%) concentration (12.8%), and a bit of tension (5.1%) and boredom (2.6%). The stage "Problem statement - identifying of scientific problem, setting purpose and concrete research questions" received almost the same rating (6.03 ± 2.41), and similar emotions - interest, curiosity (50.1%), inspiration (20.6%), enthusiasm (11.8%), but it was accompanied by a larger tension (14.7%).

The lowest assessment were given to attractiveness of the stages "Planning - formulation and determining the sequence of tasks and actions of the study" (5.52 ± 2.09) and "Determination of methods - selection and justification of methods and techniques of research, the principles of sampling" (4.85 ± 2.01). On the stage "Planning" the most frequent emotions were interest (30%), inspiration (16,6%), concentration (20.0%), tension (16.7%), and boredom (6,7%). The stage "Determination of research tools" were associated with the largest number of negative emotions - tension (22.6%), boredom (22.6%), with positive emotions - concentration (19.4%); interest (16.1 %), inspiration (12.9%).

6.2. Analysis of the interrelations between the students' personality traits and attractiveness of the research stages

There were revealed multiple significant correlations between personality traits of students and their attitudes toward different stages of research.

Personality traits - persistence (factor Self control) and curiosity (factor Expressiveness) - positively correlate with a preference of the stage "Problems Statement" ($p = 0.007$ and $p = 0.02$). Emotional stability positively correlates with preference of the stage «Planning" ($p = 0.005$) and the stage "Reflection" ($p = 0.02$). Sensitivity (factor Expressiveness) positively correlates with preference of the stage "Data Collection" ($p = 0.029$).

Table 2. The correlations between personality traits of students and their assessment of different stages of a research

Personality traits	Stage of research	τ Kendall	p
Persistence	Problems Statement	0.32	0.007
Curiosity		0.29	0.020
Enervation	Planning	- 0.41	0.005
Emotional stability		0.33	0.005
Curiosity	Determination of methods	- 0.29	0.020
Sensitivity	Data Collection	0.28	0.021
Emotional stability	Reflection	0.29	0.020

Evidently, students with these personality traits like to conduct the respective stage of research work more than others stage, and are experiencing positive emotions. At the same time enervation (factor Emotional stability) negatively correlates with preference of "Planning" stage ($p = 0.001$); curiosity negatively correlates with "Determination of methods & tools" ($p = 0.02$). So that students with these personality traits demonstrate negative attitudes to these research stages and could underestimate its importance.

6.3. Analysis of the interrelations between the students' values and attractiveness of the research stages

The study found the most important for 4th year philosopher students values of Self – Assurance (mean \pm SE 5.57 \pm 4.1), Health (5.85 \pm 4.60), Self-Development (6.42 \pm 3.21), Active life (6.97 \pm 5.1), Independence (8,40 \pm 4,9), Family Happiness (8,68 \pm 5,9), Knowledge (8,88 \pm 4,2), and Productive life (8,91 \pm 4,7) that is partially consistent with other authors' results (Bezrukova, 2014). We revealed the positive correlations between the students' values and attractiveness of the research stages: "Knowledge", "Creativity", and "Aesthetics" correlate with "Orientation in the problem area" ($p = 0.018$; $p = 0.033$; $p = 0.006$) associated with a deep immersion in the scientific problem and creative thinking. Value of "Productive life" correlates with "Analysis of the results" ($p=0.014$), associated with the comprehension of the data and designing of them into the final product. Value of "Tolerance" correlates with "Planning" ($p=0.014$) as it involves patient and matured relation to the conducting of research. Students with material values gave low evaluation to the attractiveness of the stage "Orientation in problem area" ($p=0.013$) may be because of the fact that the immersion in the problem does not assume the immediate material reward.

Table 3. The correlations between the students' values and attractiveness of the research stages

Values	Stage of research	τ Kendall	p
Knowledge	Orientation in the problem area	0.24	0.018
Creativity		0.21	0.033
Aesthetics		0.27	0.006
Material wealth		- 0.25	0.013
Productive life	Analysis of the results	0.25	0.014
Tolerance	Planning	0.25	0.014

7. Discussion

The obtained results confirmed the subjective nature of student's mental representations of research activity. The attitudes of the humanities students toward different stages of a research are not homogeneous: some of these stages students prefer more than others stages. While the carrying out the different stages of a research work most of the students are experiencing ambivalent emotions. The most attractive stages for them are “Reflection”, “Data collection” and “Data analysis”; the least attractive ones are “Planning” and “Methodical stage”. It can be assumed that students estimated lower those stages of the research work which caused difficulties.

Personality characteristics and prevailing values in students can enhance the attractiveness of a particular stage of research. So, curious and persistent students prefer research stages related to “Statement of a scientific problem”, emotionally stable students prefer “Planning” and “Reflection”, sensitive students prefer stage of “Collection and primary processing of data”.

Values as a special level of behavior regulation are also correlated with students' attitudes toward the conducting of different research stages. Values of Knowledge, Creativity and Aesthetic are typical for students who prefer the stage of “Orientation in the problem area”, the value of Productive life is related to the attractiveness of the stage “Analysis and description of the results”; the instrumental value of Tolerance is important for those who prefer “Planning” stage.

8. Conclusions

The study revealed the ambivalent attitude of students to the stages of scientific work involves planning of tasks, problem statement and selection of methods and techniques, and also influence of students' personality features on preference for certain types of scientific activity. It focuses our attention on the necessity to takes them into account in an individual interaction of scientific advisors with students, on assisting students who experiences difficulties in scientific work.

The results provide new data that are useful for the development of recommendations and programs of psycho-pedagogical support of high school students in their scientific and research work, and for

individual counseling of students by their scientific advisers. We see a continuation of our study in the confirmation of received data on samples of students of other specialties.

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